

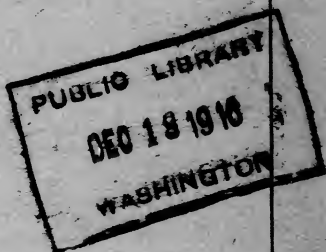
64TH CONGRESS }
2d Session }

HOUSE OF REPRESENTATIVES

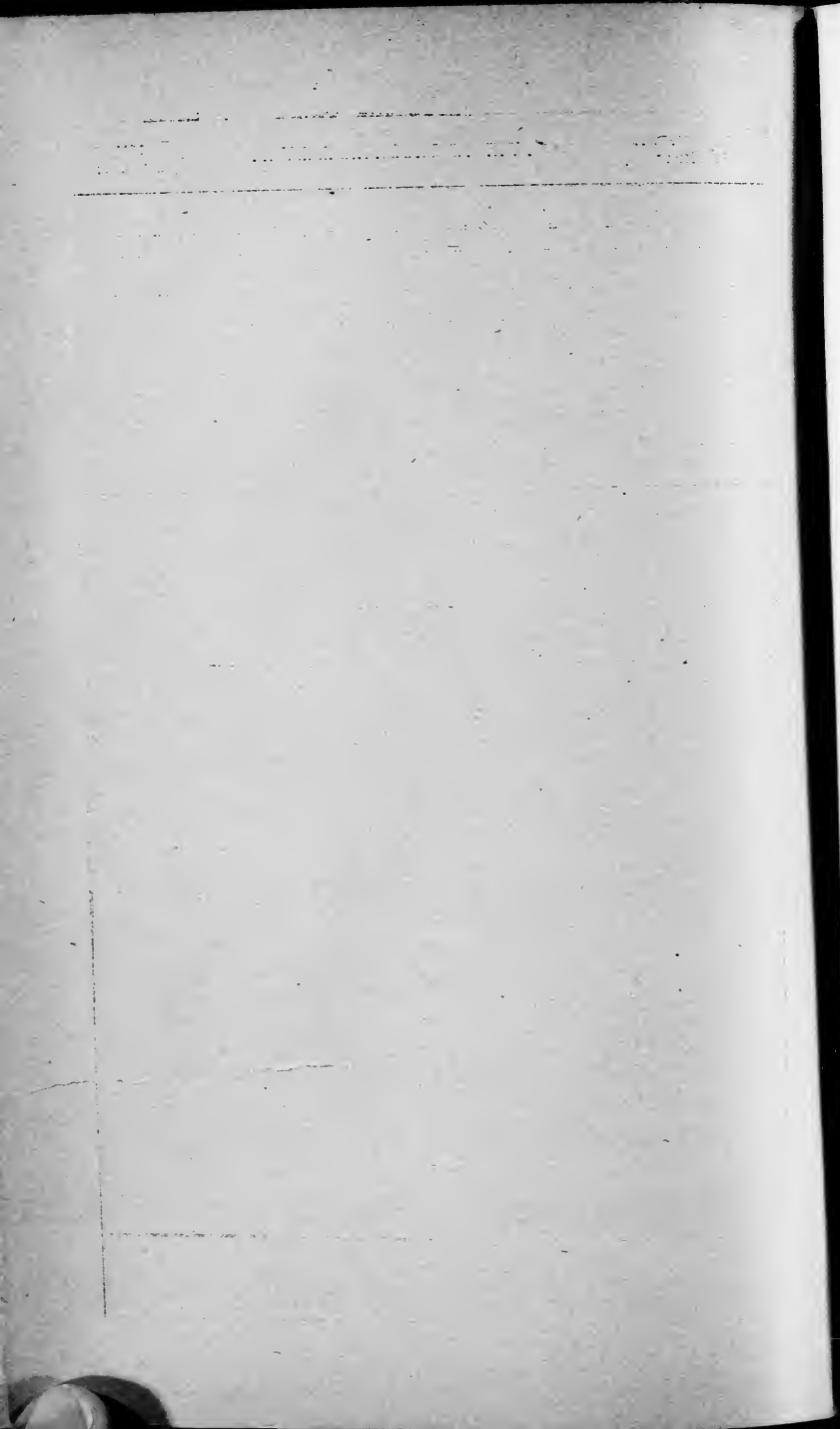
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ANNUAL REPORT OF THE
COMMISSIONERS OF THE
DISTRICT OF COLUMBIA
YEAR ENDED JUNE 30, 1916

Vol. II
ENGINEER DEPARTMENT
REPORTS



WASHINGTON
1916



ANNUAL REPORT OF THE
COMMISSIONERS OF THE
DISTRICT OF COLUMBIA
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TABLE OF CONTENTS.

	Page.
Ashes, collection of.....	35
Asphalt and cements, report of inspector.....	43
Asphalt, sheet, specifications for.....	175
Boilers, steam, report of inspector.....	144
Bridges, report of engineer.....	10
Buildings, report of inspector.....	142
Chief clerk, report.....	163
Contracts, list of.....	164
District Building, report of superintendent.....	173
Electrical engineer, report of.....	147
Engineer Commissioner, report of.....	v
Highways, report of engineer.....	1
Insanitary buildings, report of board for condemnation of.....	174
Municipal architect, report of.....	133
Parking, report of superintendent of trees and.....	58
Permit clerk, report of.....	63
Plumbing board, report of.....	147
Plumbing inspector, report of.....	145
Refuse, miscellaneous, collection of.....	35
Repairs, report of superintendent of.....	136
Roads, suburban, report of superintendent of.....	6
Rock Creek Park, report of assistant engineer.....	169
Sewers, report of superintendent.....	98
Sheet-asphalt pavements, specifications for.....	175
Stables, Engineer Department, report of superintendent of.....	171
Steam engineers, report of board of examiners.....	144
Street cleaning, report of superintendent of.....	35
Street extension division, report of.....	55
Streets, report of superintendent.....	5
Surveyor, report of.....	51
Trees and parking, report of superintendent.....	58
Water department, report of superintendent.....	65
Water registrar, report of.....	94
Wharf committee, report of.....	167

**EXTRACT FROM REPORT OF THE COMMISSIONERS OF THE DISTRICT
OF COLUMBIA FOR FISCAL YEAR ENDED JUNE 30, 1916.**

OFFICE OF THE COMMISSIONERS
OF THE DISTRICT OF COLUMBIA,
Washington, December 1, 1916.

*To the Senate and the House of Representatives of the United States of
America in Congress assembled:*

The Commissioners of the District of Columbia herewith submit for the information of Congress, pursuant to the requirements of section 12 of an act providing a permanent form of government for the District of Columbia, approved June 11, 1878 (20 U. S. Stats., 108), a report of the official doings of that government for the fiscal year ended June 30, 1916.

* * * * *

ROADWAY PAVEMENTS.

The accompanying table shows the area in square yards of new roadway pavements laid and old roadway pavements resurfaced during the year, with the totals in square yards and miles of the various kinds of pavements at the close of the fiscal year.

Comparative statement showing character and extent of roadway pavements.

	Existing amount on June 30, 1915.		New pave- ment laid during the year (square yards).	Replaced with asphalt.	Existing amount on June 30, 1916.	
	Square yards.	Miles.			Square yards.	Miles.
Sheet asphalt and coal tar.....	2,920,969	154.54	86,983	.....	3,007,952	159.42
Asphalt block.....	594,626	30.17	9,451	816	603,261	30.59
Asphaltic or bituminous concrete:						
On concrete base.....	78,708	4.58	.....	.....	78,708	4.58
On broken-stone base.....	51,088	2.68	.....	.....	51,088	2.68
Cement concrete.....	51,997	3.00	16,658	.....	68,655	3.75
Granite block and rubble.....	465,685	25.24	.....	20,863	444,822	23.93
Vitrified block.....	25,535	1.34	.....	.....	25,535	1.34
Cobble.....	80,751	3.98	.....	11,952	68,799	3.31
Macadam.....	1,980,000	123.24	9,766	8,930	1,961,304	122.78
Gravel and unimproved.....	.....	161.42	9,744	.....	.....	161.31
Gutters on asphalt streets.....	208,389	.....	6,601	2,042	217,032	.....
Gutters on concrete streets.....	11,201	.....	.....	.....	11,201	.....
Pavements maintained by street railways.....	559,089	.....	.....	.....	559,089	.....
Total.....	7,028,037	510.19	.....	.....	7,097,446	513.69

NOTE.—67,093 square yards of sheet asphalt pavement replaced, including 38,978 square yards of asphalt surface laid on old base.

The sums appropriated for expenditures during the year under this head were as follows:

For paving new roadways and repairing old roadway pavements.....	\$525,400
For the construction and repair of suburban roads.....	199,200
For grading streets, alleys, and roads.....	15,000

The types of fixed roadway pavements laid during the year were sheet asphalt, asphalt block, and concrete. But a limited amount of asphalt block was laid, in comparison with sheet-asphalt, due to the low prices received during the year for sheet-asphalt pavement.

The prices paid under contract for roadway pavements during the year were as follows:

	Per sq. yd.
Laying sheet-asphalt pavement (2½-inch asphalt surface, 2-inch binder, before compression), with 6-inch concrete base.....	\$1.49
Laying vitrified-block gutters, with 6-inch concrete base.....	1.23
Laying sheet-asphalt pavement (2½-inch asphalt surface, 2-inch binder, before compression), with 5-inch concrete base.....	1.43
Laying vitrified-block gutters, with 5-inch concrete base.....	1.15
Allowance for stone furnished by the District of Columbia:	
On District wharf, per cubic yard.....	.90
On barges alongside District wharf, per cubic yard.....	.75

The prices for the fiscal year 1917 are as follows:

Laying sheet-asphalt pavement (2½-inch asphalt surface, 2-inch binder, before compression), with 6-inch concrete base.....	\$1.44
Laying vitrified block with 6-inch concrete base.....	1.30
Laying sheet-asphalt pavement (2½-inch asphalt surface, 2-inch binder, before compression), with 5-inch concrete base.....	1.40
Laying vitrified block with 5-inch concrete base.....	1.25

The current prices for resurfacing and repairing asphalt pavements under a contract for a period of two years beginning July 1, 1916, are as follows:

	Per sq. yd.
Laying sheet-asphalt pavement (2½-inch asphalt surface, 2-inch binder, before compression), with 6-inch concrete base.....	\$1.51
Laying sheet-asphalt surface (2½ inches before compression).....	.57
Laying asphalt binder (in connection with resurfacing work), per cubic foot....	.24
Laying sheet-asphalt surface for repairs, etc., within the space required by law to be kept in repair by street railway companies, per cubic foot.....	.47
Laying asphalt binder for repairs, etc., within the space required by law to be kept in repair by street railway companies, per cubic foot.....	.39

In suburban road construction, in addition to the roadways paved with sheet asphalt under contract, there were constructed about 11,230 square yards, or 0.63 mile, of cement roadways; 20,166 square yards, or 1.9 miles of macadam roadway, and 9,744 square yards, or 0.74 mile, of gravel roadway. In addition, the grading of suburban streets aggregated 25,437 cubic yards. The larger part of the appropriation for repairs to suburban roads was expended in the repairing of the trunk lines of travel. Among the principal roads repaired were New Cut Road, Massachusetts Avenue extended, Rhode Island Avenue extended, Pennsylvania Avenue SE., Georgia Avenue NW., Bladensburg Road NE., Michigan Avenue NE., Connecticut Avenue NW., and Benning Road NE.

Approximately \$34,000 was expended for surface treatments of roadways with tar and oil, and \$2,600 for sprinkling roadways with water.

MUNICIPAL ASPHALT PLANT.

The District of Columbia operates a portable municipal plant in the repair of asphalt pavements and the repair of macadam streets by the construction of an asphalt-macadam wearing surface thereon. The plant was operated 236 working days during the year, with an

average daily output of 715 cubic feet, and a total output of 168,684 cubic feet. This output is not the capacity of the plant, but its use is limited by the needs of the service. Old material is used to a large extent in the manufacture of the output. Old asphalt topping removed from the streets in resurfacing is crushed to a finely broken product to which is added new material. The materials purchased for use during the year for this plant were as follows:

Sand, 2,160.50 cubic yards.....	\$1.03
Asphaltic cement, 461.74 tons.....	10.00
Limestone dust, 205 tons.....	2.53
Screenings, 855 tons.....	1.32

There was purchased for use in operating the crusher and mixer the following large items:

Fuel oil, 23,927 gallons.....	\$0.031
Coal, 170 tons.....	3.45
Wood, 80 cords (average).....	5.00

The details of the cost of operation are contained in the report of the engineer of highways. The cost of the product laid on the street as compared with the contract price of a similar product is as follows:

	Municipal plant, per cubic foot.	Contract price, per cubic foot.
Asphalt surface (class b).....	\$0.36	\$0.47
Asphalt surface (class a).....	.4512	.52
Asphaltic binder (class a).....	.3447	.39
Asphaltic binder (class b).....	.3839	.41

The total cost of minor repairs to sheet-asphalt pavements during the year was \$41,982.41.

This cost represents the maintenance of all asphalt streets not under guaranty by contractors, a total yardage of 2,396,063. The cost per square yard was therefore about 1.9 cents.

SIDEWALKS AND ALLEYS.

The sum of \$220,000 was appropriated for paving sidewalks and alleys and in addition the sum of \$10,000 for laying sidewalks and curbs around public reservations and municipal buildings. Sidewalks are paved with cement and alleys with vitrified brick or asphalt block; 30,219 square yards of vitrified block and 5,439 square yards of asphalt block pavements were laid in alleys. There was also 2,940 square yards of concrete pavement laid in alleys, this being a new departure during the year. The cement sidewalks laid aggregated 77,072 square yards. One-half the cost of curbs, sidewalks, and alley paving is assessed against the abutting property, except in the case of public buildings and reservations. Cement sidewalks are laid under contract and alleys are paved by day labor.

The contract prices paid for laying cement sidewalks during the year were as follows:

For large jobs adjoining paved streets, per square yard.....	\$0.95
For large jobs adjoining unpaved streets and for all small jobs, per square yard....	1.15

For the fiscal year 1917 the prices are as follows:

For large jobs adjoining paved streets, per square yard.....	\$0. 96
For large jobs adjoining unpaved streets and for all small jobs, per square yard..	1. 17½

The initiative in the matter of paving sidewalks and alleys is generally left with the owners of abutting property, the Commissioners requiring a majority petition for such work before it is ordered. Exceptions are made, however, in cases where, on account of public danger or other public reason, the paving is demanded. The law requires the Commissioners to advertise for two weeks their intention to lay sidewalks and curbs and to pave alleys and to give a hearing to the property owners affected. The work is ordered subsequent to such hearing when, in the opinion of the Commissioners, it is necessary for the public safety, health, comfort, and convenience. The demand for this class of construction is constant, and increased appropriations for this work could advantageously be expended.

BRIDGES.

The Q Street bridge across Rock Creek was completed during the year and the approaches paved. By an order of the commissioners this bridge was named Dumbarton Bridge. The bridge across Rock Creek on the line of Pennsylvania Avenue was also completed during the year, and by order of the commissioners this bridge was named Meigs Bridge. A description of these two bridges will be found in the report of the Engineer of Bridges, which also gives the detail of expenditures on the smaller bridges in the District of Columbia. The engineer of bridges calls attention to the necessity for replacing the Calvert Street bridge over Rock Creek. An appropriation of \$6,000 has been made for the preparation of plans for a new bridge at this point, and it is the intention to obtain competitive designs for the structure.

Among the larger items of improvements made during the year were the reflooring of the old Aqueduct Bridge across the Potomac River, the paving of the roadway of the Connecticut Avenue bridge over Rock Creek, and the widening of the south approach to the Anacostia Bridge.

At the last session of Congress a bill was passed providing for replacing the old Aqueduct Bridge across the Potomac River with a new bridge at an estimated cost of \$1,000,000. This work was placed under the jurisdiction of the Chief of Engineers, United States Army.

SURVEYOR'S OFFICE.

The work done by the surveyor is of two classes, namely, that done for private parties and that done for the District of Columbia and the United States. For the work done for private parties fees are charged in accordance with the schedule approved by the commissioners. The total amount of fees collected during the year was \$15,005.15. The amount received during the previous fiscal year was \$12,817.95.

The surveys made for the District of Columbia and the Federal Government also considerably increased over the previous year. Considerable time was spent in making a survey of the Anacostia River and Flats for the purpose of instituting condemnation proceedings to acquire land in connection with reclamation of these flats.

Under an appropriation of \$2,500 made for surveys of old subdivisions many old boundary lines were marked out on the ground. For the present fiscal year no appropriation was made for this purpose, although the work has not been completed.

STREET AND ALLEY EXTENSIONS.

During the year 24 street, alley, and park condemnation cases were prepared and filed, an increase of 6 over the previous year. Twenty-eight street and park condemnation cases and 15 alley condemnation cases were under consideration by the courts during the year. Among the important cases were the opening of Thirteenth Street between Spring Road and Colorado Avenue; Perry Place and Spring Place; eleven small park places; the widening of Wisconsin Avenue between Garfield Street and the District line; Widening of Naylor Road between Good Hope Road and the District line; the opening and extension of Calvert Street and Cleveland Avenue; the widening of Georgia Avenue and of Benning Road.

A table appended to the report of the surveyor gives the status of all condemnation cases instituted by the District of Columbia where the proceedings have been instituted or have been completed during the year.

TREES AND PARKINGS.

The number of trees on streets, in school yards, and on playgrounds at the close of the fiscal year was 104,490. The trees planted during the year amounted to 3,421, and those removed amounted to 2,066, leaving a net increase over the preceding year of 1,355 trees. Of the total number of trees, 104,306 are planted along the curbs of streets, the increase in the number of trees along curbs being 1,488. The mileage of trees at the close of the year was 592.64, being an increase of 8.46 over the mileage of the preceding year. The trees are planted on both sides of the street and the mileage is figured on the basis of 352 trees to the mile. The length of streets planted with trees is 296.32 miles, being an increase of 4.23 over the preceding year. The amount expended for planting and care of trees was \$43,879.63. The amount spent in care and mowing of parkings was \$2,190.91. This office also issued 768 permits to grade parking terraces.

It was not possible to undertake any general trimming of trees on account of the smallness of the appropriation, and the total trees trimmed was only 10,119.

STREET AND ALLEY CLEANING.

The street and alley cleaning division serves a population of 357,749 and covers an area of approximately 70 square miles. It has charge of the cleaning of all streets, avenues, and alleys in the District of Columbia, except such work on the outlying county roads and suburban streets as is done under the supervision of the superintendent of county roads. The work is done by day labor and not by contract.

The best method of cleaning streets is by hand patrol, supplemented by washing with either squeegees or flushers. By the hand

patrol the coarser particles are removed before they have chance to be crushed by traffic into dust. The washing removes all fine dust. The area cleaned by this method has gradually been increased, and the expenditures for hand patrol work and washing represents over two-thirds of the expenditure in street cleaning work. The street flushers are used to clean roughly paved streets.

The unit cost per 1,000 square yards of this work is as follows:

Hand patrol.....	\$0.132
Machine sweeping.....	.144
Alley cleaning.....	.326
Squeegeeing.....	.106
Flushing.....	.212

The total cost of street cleaning, including all charges except interest on investment and depreciation, was \$297,317.19. With the population served, 357,749, this gives a per capita cost of \$0.831.

COLLECTION AND DISPOSAL OF CITY REFUSE.

New contracts for the collection and disposal of city refuse went into effect at the beginning of the fiscal year. The contract prices were as follows:

	Per annum.
Garbage.....	\$69,840
Miscellaneous refuse.....	28,400
Ashes.....	69,000
Dead animals.....	2,988

The contracts for garbage, miscellaneous refuse, and dead animals were for a three-year period ending June 30, 1918. The contract for ashes was for a one-year period ending June 30, 1916. For the fiscal year 1917 a new contract was made for a period of two years at a price of \$60,000 per annum.

The unit costs are as follows:

Garbage.....	per ton..	\$1.34
Ashes.....	per cubic yard..	.51
Miscellaneous refuse.....	do.....	.18
Night soil.....	per barrel..	1.17
Dead animals.....	each..	.14

The per capita cost of this service is about 61 cents.

MUNICIPAL COLLECTION OF CITY REFUSE.

At the last session of Congress the commissioners recommended an appropriation of \$300,000 toward the purchase of site and the construction of a plant for the disposal of city refuse, in accordance with plans which had been prepared under an appropriation made by Congress. The total cost of such plant was estimated at \$885,900. This appropriation was not made. The contracts for the disposal of garbage, refuse, and dead animals expire June 30, 1918, and unless municipal collection and disposal is authorized by Congress in time to construct the plant before the expiration of the present contracts either new long-term contracts must be made or some other plan adopted to carry on the work by contract during the construction of the municipal plant. The commissioners have included in their esti-

mates for the ensuing fiscal year a modified plan, providing for the construction of a reduction plant on land owned by the District of Columbia at Blue Plains, D. C., to take care of garbage and dead animals. The question as to whether the municipality is to take care of the disposal of city refuse itself or to continue the method of collection and disposal by contract should be settled at an early date.

BUILDING OPERATIONS.

The estimated value of building construction, including repairs, during the year, not including buildings under construction by the Federal Government, was \$13,495,535, an increase over the preceding year of \$4,895,603.

The number of permits issued for buildings, building repairs, awnings, signs, engines, motors, etc., was 5,797, an increase of 226 over the preceding year.

The total number of new buildings constructed during the year was 1,839, an increase of 353 over the preceding year. Of these 1,349 were dwellings, an increase of 194 over the preceding year; 60 were apartment houses, an increase of 18 over the preceding year, and 430 were business buildings, an increase of 141 over the preceding year. The permits issued for repairs to buildings were 3,236, a decrease of 132 under the preceding year.

The distribution of the cost of these improvements, including repairs, is as follows:

	Buildings.	Repairs, etc.
Northeast.....	\$411,423	\$75,077
Southeast.....	252,610	50,195
Northwest.....	4,037,764	837,551
Southwest.....	105,655	101,347
County.....	6,983,979	621,519
Total.....	11,791,431	1,685,689
	1,685,689	
Sum total.....	¹ 13,477,120	

¹ Does not include awnings or signs, cost of which is estimated.

It is estimated that there are 63,590 brick buildings and 26,576 frame buildings in the District of Columbia, of which 1,529 brick and 310 frame were erected during the year. There were torn down during the year 38 brick and 71 frame buildings.

Permits for buildings are issued upon the payment of a fee, which is intended to cover the cost of the operation of the building inspector's office. The fees collected during the year amounted to \$31,285.05, an increase of \$4,650 over the preceding year. The receipts for fees just about equaled the salaries of the office, but expenses incurred for transportation and contingencies made the total expenses \$2,797.32 in excess of the receipts. The building operations in the District of Columbia were the largest since the year 1912.

About 800 passenger elevators were inspected by the two elevator inspectors during the year.

INSPECTION OF STEAM BOILERS.

The number of steam boilers inspected by the inspector of steam boilers during the year was 525. The compensation of this official is received from fees paid by the owners of the boilers. The total amount of fees reported by him during the year was \$2,300, and the expenses of inspection \$325, leaving a net compensation of \$1,975.

EXAMINATION OF STEAM ENGINEERS.

The board of examiners of steam engineers held 53 meetings, and examined 118 applicants, of whom 39 were found competent and 79 incompetent.

CONSTRUCTION OF MUNICIPAL BUILDINGS.

During the year seven buildings were under construction, as follows:

Building.	Location.	Estimated cost.
New Central High School, No. 173....	Eleventh and Thirteenth Streets, Florida Avenue and Clifton Street.	\$1,118,886.67
Dunbar High School, No. 174.....	First Street, between N and O Streets.....	414,719.13
Park View School, No. 175.....	West side of Warder Street, between Newton and Otis Streets.	120,796.46
Western High School, No. 117, re-building.	Thirty-fifth and R Streets NW	132,572.30
Powell School, No. 157, addition.....	School Street, opposite Lamont Street.....	71,869.00
Engine house No. 28.....	Connecticut Avenue, between Ordway and Porter Streets NW.	25,613.52
Truck house No. 1.....	New Jersey Avenue, between D and E Streets NW.	35,595.21

The plans and specifications for all buildings appropriated for were completed and contracts made before the end of the fiscal year with the exception of the fish market and the public convenience station at Fifteenth and H Streets NE. The Central and Dunbar High Schools and the Park View School were completed and occupied on the opening of the school term, October 2, 1916. The Powell School addition is expected to be completed and ready for occupancy on December 1, 1916. Truck house No. 1 on New Jersey Avenue, between D and E Streets, and engine house No. 28, at Connecticut Avenue and Ordway Street, have been completed.

School buildings and other District buildings have heretofore been contracted for at a cost of between 14 and 17 cents per cubic foot. On account of the great advance in wages and in the price of building materials the buildings to be constructed during the next fiscal year will probably cost from 18 to 20 cents per cubic foot. The increase in cost since 1898 has been about 60 per cent.

REPAIRS TO MUNICIPAL BUILDINGS.

All municipal buildings are kept in repair by the superintendent of repairs under the direction of the municipal architect. In repairs to school buildings \$119,777.11 was spent.

In repairs to engine houses of the fire department \$11,780.85 was spent.

In repairs to police stations \$5,793.02 was spent.

In repairs to the police court building \$990.09 was spent.

PLUMBING AND PLUMBING INSPECTION.

During the year the plumbing office made 35,742 inspections, a decrease under the preceding year of 1,736. It is estimated that the total cost of new plumbing work installed in private buildings during the year was \$962,978, and the estimated value of repairs and remodeling to old plumbing is \$331,695. This is an increase over similar construction during the preceding year. The average number of inspections per day per man was 15, and the greatest number 61. Fifteen cases of violations of the plumbing regulations were prosecuted in the police court.

Under the compulsory drainage act 27 cases were forwarded by the health department and other branches of the District government for the installation of sewer and water, in those instances where the owner had failed to do the work after notice served upon him. In 15 of these cases the owner or agent subsequently agreed to install the services, and in 1 case the building was torn down by the owner. Only in 3 cases was it necessary for the work to be done by the District of Columbia and an assessment of the cost made against the property. There are 8 cases now under consideration.

PUBLIC CONVENIENCE STATIONS.

The three public convenience stations located at Seventh Street and Pennsylvania Avenue NW., Thirteenth Street and Pennsylvania Avenue NW., and Ninth and K Streets NW. were operated during the year from 6 a. m. until midnight. The total number of patrons of these stations was 3,122,948. Receipts from pay compartments aggregated \$3,098.16.

The use of these stations demonstrates their value and necessity to the community, and it is the intention of the commissioners to recommend the construction of additional stations at points where the public demand is urgent.

PLUMBING BOARD.

During the year the plumbing board held 26 sessions for examination for candidates for license as master plumber and gas fitter. The total number of applicants examined was 48, of whom 22 were original candidates, of whom 6 passed and 16 failed, and 26 were candidates who had been previously examined, of whom 1 passed and 25 failed.

STREET LIGHTING.

There are 18,805 street lamps of all kinds in the District of Columbia, as follows:

Mantle gas.....	10,248
Electric arc.....	840
Electric incandescent.....	7,238
Street designation lamps.....	479

18,805

This was a net increase during the year of 604 lamps.

Improved incandescent lighting was extended during the year on slightly over 3 miles of streets involving the erection of 528 lamps of 100 candlepower each on Pennsylvania Avenue SE., from Second

Street to Seventeenth Street; Eighth Street SE., from Pennsylvania Avenue to M Street; Eleventh Street SE., from Pennsylvania Avenue to O Street; Seventh Street NW., from New York Avenue to Florida Avenue; and Nichols Avenue SE., from Navy Yard Bridge to Sheridan Road.

FIRE-ALARM, TELEPHONE, AND TELEGRAPH SERVICE.

Four and eight-tenths miles of underground cable were installed during the year. The amount in service at the close of the year was 140 miles.

The aerial cable in service at the end of the fiscal year was 5.3 miles.

Twelve new fire-alarm boxes were placed in service during the year, making a total of 593. The total number of fire alarms received and transmitted during the year was 1,362, of which 130 were false.

The total number of poles connected with street and steam railroads, telephone, telegraph, and electric light, and the District service at the end of the year was 18,072, of which 17,202 are line poles and 870 guy poles.

The fees collected for the inspection of electric wiring in private premises amounted to \$6,008.

PERMITS.

The permits issued by the permit clerk of the engineer department other than those for buildings amounted to 14,071, and of this number 9,565 were covered by fees and 4,506 were issued without fee.

ROCK CREEK PARK.

The jurisdiction and control over Rock Creek Park is placed by law under the Commissioners of the District of Columbia and the Chief of Engineers, United States Army, acting jointly. The amount appropriated for the care and maintenance of the park during the year was \$18,000. The principal improvement during the year was the completion of the macadamizing of Ross Road, which was begun in the preceding fiscal year. The sum spent on this work was \$4,662.12. In the general repair and care of the park \$8,694.99 was expended, and in the cutting and hauling of fallen timber \$1,342.92. The timber was cut into firewood, of which 222 cords were sold to the public schools and 30 cords to private parties, the amounts received from this source being turned in to the Treasury.

The bridle path along the west side of Rock Creek was widened and relocated for about three-fourths of a mile and connected with the bridle-path system farther west. Additional temporary toilet facilities were provided, two baseball diamonds were laid off, the existing swimming pools were provided with rustic shelters, and one new swimming pool established. It is proposed during the ensuing year to clear of undergrowth as much as possible the area of the park adjacent to roadways and in the more frequented sections of Rock Creek Park and the Piney Branch Parkway and to extend the system of bridle paths and footpaths, and, in addition, it is contemplated to construct another line of roadway crossing the park.

ANACOSTIA RIVER AND FLATS.

The total expenditure on the project for the reclamation and improvement of the Anacostia River and Flats from the Anacostia Bridge to the District line to June 30, 1916, as reported by the Chief of Engineers, United States Army, under whom this work is being prosecuted, amounted to \$425,766.17. The balance of the appropriation unexpended was \$256,632.28. The amount required to be appropriated for the completion of the project in addition to funds heretofore appropriated is estimated at \$2,006,000 (exclusive of the cost of the acquisition of the land). At the end of the fiscal year 1916 the project was about 16 per cent completed. The work done included the dredging of 1,143,024 cubic yards of material, the construction of 7,702 feet of masonry sea wall, and the placing of 98,703.6 cubic yards of riprap. By the operations to date 120 acres of land have been reclaimed or partially reclaimed.

HARBOR FRONT.

The total amount received from the rental of wharves and river frontage placed by law under the direction of the commissioners was \$19,601.75, divided as follows:

Potomac River front.....	\$17,278.00
Anacostia River front.....	956.25
James Creek Canal.....	1,367.50
	<hr/>
	19,601.75

The actual water frontage in the District of Columbia devoted to commerce, with the exception of canals, is about 2 miles. The total available water frontage is about 18 miles, of which about 8 miles is set aside for parks and purposes of the United States. The largest amount of wharf property under the control of the commissioners is along the Washington Channel. The total frontage along this channel is 9,275 linear feet, of which 4,675 linear feet, between the grounds of the War College and the south curb line of N Street, is under the control of the United States. Of the remaining 4,600 linear feet, 4,021 linear feet is under the jurisdiction of the commissioners and 559 linear feet, between Thirteenth and Fourteenth Streets, has been designated by Congress as the site of the central heat, light, and power plant.

Along the frontage under the control of the commissioners are located the harbor police station and dock of the harbor boat, house and dock of the fire boat, the District morgue, the municipal fish wharves, and a District property yard. The balance of the frontage is leased to private parties, generally for terms of five years, the basis of rental being a net return of 4 per cent on the estimated value of the wharf property, with the requirement that the lessee shall make all improvements and repairs.

The public space along James Creek Canal, in the southeastern section of the city, extending from N to P Streets, a distance of 1,000 feet, is under lease for commercial purposes. By an order of the commissioners, dated September 29, 1916, based upon a recommendation by the health officer, it has been determined to fill the canal between N and P Streets as soon as questions affecting existing leases have been

settled. This will leave the canal open from P Street to the Anacostia River, a distance of about 3,000 linear feet, along the grounds of the War College and Engineer School.

CONDEMNATION OF INSANITARY BUILDINGS.

The board for the condemnation of insanitary buildings held seven meetings and issued orders for the demolition of 64 buildings and the repair of 89 buildings. Of those demolished 48 were in streets and 16 in alleys, and of those repaired 57 were in streets and 32 in alleys.

Since the creation of the board it has examined 6,583 buildings, of which 2,040 were demolished and 1,527 repaired. Of buildings in alleys 664 were demolished and 490 repaired, and of buildings in streets 1,376 were demolished and 1,037 repaired.

The estimated number of tenants required to secure other quarters through the action of the board in the demolition of buildings has been 5,947. The estimated number of tenants benefited by repairs to buildings required by the board is 5,116.

SEWERS.

The length of main and pipe sewers constructed during the year was 20.15 miles. The total length of main and pipe sewers in the District of Columbia on June 30, 1916, was 702.06, of which 139.53 are main sewers and 562.53 miles are pipe sewers. The total cost of the sewerage system to June 30, 1916, was \$13,294,695.25. The cost of the sewage-disposal system to June 30, 1916, was \$4,671,279.19, making the total cost of the complete system to June 30, 1916, \$17,965,974.44.

The main sewage outfalls of the sewage-disposal system on the Potomac River about opposite Alexandria were under observation throughout the year. In general the condition of the river water-continued good, the beaches free of any deposit, and the river bottom failed to disclose appreciable evidence of sludge deposits. There is an approaching need, however, for the removal of a considerable portion of the organic matter in sewage before discharging it into the river. This has been indicated during the year by odors observable for the first time over considerable areas in the vicinity of the outfall. With the increasing volume of sewage these conditions will gradually grow worse unless an adequate remedy is applied. This remedy would involve the installation of sewage-treatment works, and the commissioners have given this matter consideration in the preparation of their estimates to Congress.

The sanitary survey of the river, undertaken by the United States Public Health Service, particularly with reference to the discharge of sewage from the District of Columbia, was published during the year, and indicated that in important respects there was no apparent need at present for any apprehension that the sanitary condition of the river is such as to be a menace to health by the pollution of oyster beds in the lower river or otherwise. This thorough study of the river explains the peculiar natural local conditions favorable to the disposal of sewage by dilution, but also indicates that there is a limit to the volume of sewage which may be so disposed. When this limit is reached it must be expected that unfavorable conditions will develop.

Metropolitan sewerage system.—In the last District appropriation act authority was granted the commissioners to enter into agreements with the authorities of Maryland to take care of the question of the streams carrying sewage from the adjacent counties of Maryland into the District of Columbia. Gradual installation of sewerage systems in the bordering Maryland towns which discharge their sewage into these streams is the principal cause of increase in pollution. It is hoped under this legislation to permanently remedy this condition by providing the necessary intercepting sewers to connect the Maryland system with the District of Columbia system.

Sewage disposal system.—The sewage disposal system was in continuous operation throughout the year, handling the sewage of practically the entire District, as well as the storm water from the 900 acres of low area within the District. At the pumping station at the foot of New Jersey Avenue 21,034,000,000 gallons of sewage and 303,000,000 gallons of storm water were pumped. In this service 10,156,250 pounds of coal were used. In addition to this main station there are substations at Poplar Point and Woodridge. The Poplar Point station pumped 273,000,000 gallons of sewage, and the Woodridge station 5,156,000 gallons.

Sewer construction.—The following table shows the length and cost of sewers constructed during the year:

Section.	Length.	Cost.
	<i>Feet.</i>	
1. County west of Rock Creek.....	21,987.08	\$76,651.65
2. County east of Rock Creek.....	26,499.16	46,900.73
3. County west of Anacostia River.....	7,822.29	16,569.54
4. County east of Anacostia River.....	26,001.31	121,203.31
5. Washington City.....	19,503.46	59,110.21

PARKS.

Within the last three years \$75,000 has been appropriated for the acquisition of small parks outside of the limits of the original city of Washington. The appropriations for these parks not only required that they should be located outside of the city of Washington, but that they should be surrounded by streets. The commissioners have made selections of small parks complying with these two conditions, and the parks have either been condemned or are in process of condemnation. A considerable proportion of the money appropriated can not be judiciously expended, however, due to the lack of land complying with requirements of the law.

The commissioners do not believe that they should be restricted in their selections, but should be left free to select for small parks land situated anywhere within the District of Columbia, and it is their intention to submit to Congress a list of such parcels as they think should be acquired.

In their estimates for the ensuing fiscal year they have also included items providing for the acquisition of larger parks as follows: Patterson tract, lying north of Florida Avenue and east of New York Avenue; Dean tract, located at the intersection of Connecticut and Florida Avenues; and the Klinge Valley from Woodley Road to the Zoological Park. For the Klinge Valley Park approximately 8½ acres will be required.

WATER MAINS.

During the year 54,114 linear feet, or 10.2 miles, of water mains of all sizes were laid, making the total length of water mains in service at the end of the year 3,220,487 linear feet, or 609.9 miles; 6,083 linear feet of water main of various sizes were abandoned.

Two hundred and fifty-three hydrants, 5 public hydrants, 4 sanitary fountains, and 1 horse fountain were erected during the year, and 183 fire hydrants, 4 public hydrants, and 1 sanitary fountain were abandoned, making the total number in service at the end of the year as follows:

Fire hydrants.....	3,444
Public hydrants.....	218
Sanitary fountains.....	16
Horse fountains.....	153

There are also 44 deep public wells and 9 shallow public wells in service.

WATER CONSUMPTION AND WASTE.

By means of the installation of water meters and the operation of the pitometer service for the detection of leaks, the mean daily rate of consumption has been reduced from 52,512,000 gallons reported during the preceding year to 49,698,000 gallons, and the per capita rate has been reduced from 144 gallons to 136.5 gallons. Measures to reduce the consumption of water were started in 1905, when the mean daily rate had reached 65,000,000 gallons and the per capita rate about 227 gallons.

The total pumpage of water during the year was 8,623,533,740 gallons, and the coal burned in this pumping amounted to 5,845.71 tons.

In the report for last year attention was invited to the very large use of water in Federal buildings for condensing and cooling purposes. As there is no direct charge against Federal departments for water delivered to them, the cost of the water is seldom taken into consideration when additions are made to the mechanical equipment in such buildings, and, with an unlimited supply of water available, without cost, there is no incentive to conserve the supply by the use of cooling devices.

Some of the largest users of water among the Federal departments are the Washington Navy Yard, averaging 1,860,518 gallons per day; the Government Printing Office, 2,497,402 gallons; the Bureau of Engraving and Printing, 168,382 gallons; and the Capital power plant, 648,159 gallons.

WATER REVENUES AND EXPENDITURES.

The water revenues from all sources during the year amounted to \$866,133.22. The cash expenditures amounted to \$617,690.45. The outstanding liabilities, including balance of appropriation not available to June 30, 1916, amounted to \$204,831.47, leaving a balance available for appropriation carried forward to the fiscal year 1917 of \$45,137.86. Of the total cost of work done during the year 42.1 per cent was for new work, 39.7 per cent for operation, 12.7 per cent for general repairs, and 5.5 per cent for replacements.

WATER METERS.

During the year there were installed 5,880 water meters, at a cost of \$69,617.67. This makes the total number in use on June 30, 1916, 53,983. The percentage of water services now metered is 77.5. The average cost of installing a meter is \$11.27, of which amount the meter costs \$5. The rate charged for water on metered services during the year was 4 cents per 100 cubic feet for all used in excess of 7,500 cubic feet. The minimum charge to each premises, allowing the use of 7,500 cubic feet, is \$4.50 per annum. On unmetered services the rate for domestic service is charged according to stories and front feet. For premises of two stories with a front width of 16 feet or less the minimum rate is \$5 per annum; for each additional front foot or fraction thereof 31 cents is charged. For each additional story one-third of the charges as computed above is added. For business premises not metered rates vary from \$1 to \$25 per annum. Where the rate is \$25 or more a meter is required to be installed at the expense of the consumer.

Very respectfully,

OLIVER P. NEWMAN,
LOUIS BROWNLOW,
CHARLES W. KUTZ,

Commissioners of the District of Columbia.

ORGANIZATION OF THE ENGINEER DEPARTMENT, D. C.

Lieut. Col. CHARLES W. KUTZ, *Corps of Engineers, United States Army, Engineer Commissioner.*
Capt. R. G. POWELL, *Corps of Engineers, United States Army,* } *Assistants.*
Capt. J. J. LOVING, *Corps of Engineers, United States Army,* }

UNDER THE IMMEDIATE SUPERVISION OF THE ENGINEER COMMISSIONER.

RECORD DIVISION—
D. E. GARGES, *Chief Clerk.*
WHARF COMMITTEE—
DANIEL E. GARGES, *Chief Clerk, Engineer Department.*
D. E. McCOMB, *Engineer of Bridges.*
RUSSELL DEAN, *Harbor Master.*
ROCK CREEK PARK—
L. R. GRABILL, *Assistant Engineer in Charge.*
ELECTRICAL DEPARTMENT—
WARREN B. HADLEY, *Electrical Engineer.*
ENGINEER DEPARTMENT STABLES—
J. W. BEALE, *Superintendent.*
DISTRICT BUILDING—
Capt. R. G. POWELL, } *Superintendents.*
Capt. J. J. LOVING, }

UNDER THE IMMEDIATE SUPERVISION OF CAPT. LOVING.

HIGHWAYS (STREETS, ROADS, BRIDGES, ETC.)—
C. B. HUNT, *Engineer of Highways.*
Sidewalks and alleys—
H. N. MOSS, *Superintendent of Streets.*
Construction and maintenance of suburban roads—
L. R. GRABILL, *Superintendent of Suburban Roads.*
Construction and care of bridges—
D. E. McCOMB, *Engineer of Bridges.*
STREET AND ALLEY CLEANING, COLLECTION OF GARBAGE, ETC.—
J. W. PAXTON, *Superintendent of Street Cleaning.*
ASPHALTS AND CEMENTS—
J. O. HARGROVE, *Inspector of Asphalts and Cements.*
SURVEYOR'S OFFICE (Including street extensions)—
M. C. HAZEN, *Surveyor.*
TREES AND PARKINGS—
TRUEMAN LANHAM, *Superintendent of Trees and Parkings.*
PERMITS—
H. M. WOODWARD, *Permit Clerk.*

UNDER THE IMMEDIATE SUPERVISION OF CAPT. POWELL.

WATER DEPARTMENT—
J. S. GARLAND, *Superintendent.*
Water rates—
G. W. WALLACE, *Water Registrar and Chief Clerk.*
SEWER CONSTRUCTION AND MAINTENANCE—
ASA E. PHILLIPS, *Superintendent of Sewers.*
MUNICIPAL ARCHITECT—
SNOWDEN ASHFORD.
Repairs to municipal buildings—
HENRY STOREY, *Superintendent of Repairs.*
BUILDING INSPECTION—
MORRIS HACKER, *Inspector of Buildings.*
Plumbing plans and inspection—
A. R. MCGONEGAL, *Inspector of Plumbing.*
Plumbing board—
P. C. SCHAEFER.
J. S. O'HAGAN.
SAMUEL TAPP.
Board of examiners of steam engineers—
E. F. VERMILLION.
H. BOESCH.
W. I. EVANS.
BOARD FOR CONDEMNATION OF INSANITARY BUILDINGS—
Capt. R. G. POWELL, *Assistant to Engineer Commissioner.*
Dr. WILLIAM C. WOODWARD, *Health Officer.*
MORRIS HACKER, *Inspector of Buildings.*

REPORT OF THE OPERATIONS OF THE ENGINEER DEPARTMENT OF THE DISTRICT OF COLUMBIA.

SURFACE DIVISION—REPORT OF THE ASSISTANT IN CHARGE.

OFFICE OF THE ENGINEER COMMISSIONER
OF THE DISTRICT OF COLUMBIA,
Washington, October 7, 1916.

COLONEL: I have the honor to transmit herewith annual reports, giving in detail the operations during the fiscal year ended June 30, 1916, of the surface division; the surveyor's office, including the office of street extensions; the office of the inspector of asphalts and cements; the office of superintendent of trees and parkings; and the superintendent of street cleaning. In the report of the engineer of highways are included the reports of the superintendent of streets, the superintendent of suburban roads, and the engineer of bridges.

Very respectfully,

J. J. LOVING,
Captain, Corps of Engineers, U. S. Army,
Assistant to the Engineer Commissioner.

Lieut. Col. CHAS. W. KUTZ,
Corps of Engineers, U. S. Army,
Engineer Commissioner, District of Columbia.

REPORT OF THE ENGINEER OF HIGHWAYS.

WASHINGTON, D. C., *August 21, 1916.*

SIR: I have the honor to submit the following report of the operations of the office of the engineer of highways for the fiscal year ended June 30, 1916:

The total amount of funds appropriated by Congress and deposited by corporations and others for disbursement by the surface division aggregated \$1,121,850, of which \$220,000 was for paving sidewalks and alleys in all parts of the District; \$525,400 for paving new roadways and repairing old roadway pavements; \$199,200 for construction and repair of suburban roads; \$27,600 for construction and repair of bridges and viaducts; \$15,000 for grading streets and avenues; \$10,000 for sidewalks and curbs around Government reservations, buildings, and parks; \$124,650 was spent in repairing pavements disturbed by other branches of the District government and by various corporations and others.

Summary of work under appropriation for improvements and repairs for year ended June 30, 1916.

Character of work.	Streets and avenues.	Suburban roads and streets.	Repairs to asphalt pavements.	Total.
Sheet asphalt pavement.....square yards..	55,456	30,758	128,884	115,098
Asphalt surface.....do.....			38,978	38,978
Vitrified block gutters.....do.....	4,957	1,644	3,986	10,587
Asphalt block.....do.....	9,451			9,451
Cement concrete pavement.....do.....	5,428	11,330		16,658
Granite block.....do.....	2,663			2,663
Macadam roadway.....do.....		9,766		9,766
Cobble and granite gutters.....do.....		6,573		6,573
Gravel roadway.....do.....		9,744		9,744
Old pavement removed.....cubic yards..			8,724	8,724
Old cobble and granite removed.....square yards..	31,525	7,600		39,125
Granite and bluestone curb set.....linear feet..	15,731	9,133	8,222	33,086
Cement curb formed and laid.....do.....	4,699			4,699
Curb reset.....do.....	19,138		15,902	35,040
Grading.....cubic yards..	26,266	54,799	1,440	82,505
Sidewalks and curbs, under assessment and permit work.....square yards..				69,901
Sidewalks and curbs around Government reservations.....do.....				7,063
Sidewalks, whole cost.....do.....				108
Alley pavements, assessment work.....do.....				
Asphalt block.....				5,439
Vitrified block.....				30,219
Cement.....				2,940

1 769 square yards asphalt block replaced with asphalt.

The types of fixed roadway pavements laid during the year were sheet asphalt, asphalt block, and concrete. The latter pavement was selected this year for the first time for use on two streets within the city limits—Union Street and Hanover Street. A limited amount of asphalt block was laid in comparison with our standard pavement, which is sheet asphalt. This latter circumstance was contributed to by the unusually low price bid for sheet asphalt. No bituminous concrete pavements were laid. A limited yardage of concrete alley pavements (2,940 square yards) was laid, while of vitrified block 30,219 and of asphalt block 5,439 yards were constructed.

The construction of the Q Street Bridge across Rock Creek was completed during the year and the approaches paved. The structure of the Pennsylvania Avenue Bridge across Rock Creek was completed and contracts let for the paving of the approaches. Work under these latter contracts was in progress at the end of the year. The commissioners by formal orders named the Q Street structure Dumbarton Bridge, and the Pennsylvania Avenue structure Meigs Bridge. Due to delays in the court proceedings the acquisition of the land necessary for the construction of the Benning Road Viaduct was not completed and actual construction work was not practicable during the year. Conditions indicate that contracts can be let during the coming year. All new sidewalk work was of cement concrete, as has been the rule for many years past.

MUNICIPAL ASPHALT PLANT.

The municipal asphalt plant was operated during 236 working days during the year—a full average experience. The total output was 168,684 cubic feet of the various products—an average daily output of 715 cubic feet, about the same as our previous experience. This output, it should be understood, is not limited by the capacity of the plant, but by the needs of the service.

The crusher, by which old asphalt topping removed from the streets is reduced to a finely broken product for use in the asphalt plant, was operated for 52 days during the year—a comparatively brief period due to the small amount of material available for crushing.

The plant in all its details was maintained in as good working condition as was practicable, and the comparative costs of the products indicate that this was accomplished. The repairs and upkeep of the plant proper cost \$365.93, and of the crusher \$83.04, and these costs are incorporated, separate from obsolescence, in the costs of the output.

The following amounts of materials were purchased for use in manufacturing the output during the year:

Sand, 2,160.50 cubic yards, cost.....	\$1.03
Asphaltic cement, 461.74 tons, cost.....	10.00
Limestone dust, 205 tons, cost.....	2.53
Screenings, 855 tons, cost.....	1.32

There was purchased for use in operating the crusher and mixer the following large items:

Fuel oil, 23,927 gallons, cost.....	\$0.31
Coal, 170 tons, cost.....	3.45
Wood, 80 cords, cost (average).....	5.00

The costs of operation, including material and labor, is kept from day to day, and the summary of this data for the fiscal year develops the following unit costs for the year's operations:

OPERATION OF CRUSHER.

Period of operation 52 working days; output of crusher, 2,327 cubic yards.	
Labor and fuel (\$1,320.06 plus \$83.20).....	\$1,403.26
Cost per cubic yard, \$0.603.	
Maintenance, renewals, and repairs.....	83.04
Cost per cubic yard, \$0.0357.	
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Overhead costs:	
Capital invested, \$1,910, at 3½ per cent.....	66.85
Obsolescence, 5 years, at 20 per cent.....	382.00
Cost per cubic yard, \$0.193.	
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	448.85
<hr/>	
Cost of crushed product, per cubic yard:	
Labor and materials.....	.603
Repairs to plant.....	.036
Overhead.....	.193
<hr/>	
	.832
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OPERATION OF PLANT.

Period of operation, 236 days; total output, 168,684 cubic feet.	
At plant:	
Labor (3.56 cents per cubic foot).....	6,004.18
Fuel oil (0.50 cent per cubic foot).....	776.68
Coal (0.27 cent per cubic foot).....	455.80
Wood (0.13 cent per cubic foot).....	223.60
Binder stone.....	82.50
Tool repair (0.20 cent per cubic foot).....	329.66
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Total (4.71 cents per cubic foot).....	7,872.42
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Haul from plant to street:	
Labor (3.85 cents per cubic foot).....	5,904.05
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On street:	
Labor (12.3 cents per cubic foot).....	18,905.53
Painting joints (0.15 cent per cubic foot).....	236.00
Wood (0.13 cent per cubic foot).....	223.60
Tool repair (0.10 cent per cubic foot).....	164.83
<hr/>	
Total (12.68 cents per cubic foot).....	19,529.96
<hr/>	
Maintenance and repairs:	
At plant (0.22 cent per cubic foot).....	365.93
On street (0.15 cent per cubic foot).....	228.94
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Total (0.37 cent per cubic foot).....	594.87
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Overhead:	
Capital invested, \$6,900, at 3½ per cent.....	\$241.50
Obsolescence, 5 years, at 20 per cent.....	1,380.00
Total (1 cent per cubic foot).....	<u>1,621.50</u>
Supervision:	
Foremen and overseers (3.7 cents per cubic foot).....	<u>6,239.67</u>
Total manufacturing costs per cubic foot:	Cents.
Plant, labor.....	4.71
Hot haul.....	3.85
Street work.....	12.68
Maintenance of plant and tools.....	.37
Overhead—	
Interest and obsolescence.....	1.00
Supervision.....	3.70
	<u>26.31</u>

The sand used was bought under contract at 44 cents per cubic yard and hauled from the wharf to the plant at a cost of \$1,266.26 for 2,160.5 cubic yards, or 59 cents per cubic yard, a total of \$1.03 per cubic yard. All other expendable material was delivered at the plant site at the costs thereof used herein.

The cost of a cubic foot of old material mixture from the above was as follows:

0.67 cubic foot crushed material, at \$3.2 cents per cubic yard.....	\$0.0206
0.27 cubic foot sand, at \$1.03 per cubic yard.....	.0103
2.1 pounds limestone dust, at \$2.53 per ton.....	.0026
3.89 ¹ pounds asphaltic cement, at \$10 per ton.....	.0195
Total, material.....	.0530
Manufacturing and placing cost.....	.2631
Total (cubic foot).....	.3161
Asphaltic concrete mixture:	
0.5 cubic foot screenings at \$1.32 per ton.....	.0330
0.5 cubic foot sand at \$1.03 cubic yard.....	.0190
4.2 pounds limestone dust at \$2.53 per ton.....	.0053
9.16 ¹ pounds asphaltic cement, at \$10 per ton.....	.0458
Total material.....	.1031
Manufacturing and placing costs.....	.2631
Total per cubic foot.....	.3662

For the purpose of indicating that that portion of the law is being complied with which authorizes the operation of this plant only when the cost of the product is economical in comparison with contract work, the following statement of costs on which contract figures are comparable is submitted:

Asphalt surface topping mixture (class b):	
1 cubic foot building sand, at \$1.03 per cubic yard.....	\$0.0381
4.20 pounds limestone dust, at \$2.53 per ton.....	.0053
9.16 ¹ pounds asphaltic cement, at \$10 per short ton.....	.0458
Material cost.....	.0892
Manufacturing and placing cost.....	.2631
	.3523
Topping, \$0.36 per cubic foot; contract price (class b), \$0.47 per cubic foot. *	
Asphalt surface topping mixture (class a):	
1 cubic foot building sand, at \$1.03 per cubic yard.....	\$0.0381
4.16 pounds limestone dust, at \$2.53 per short ton.....	.0053
9.16 ¹ pounds asphaltic cement, at \$31.60 per short ton.....	.1447
Material cost.....	.1881
Manufacturing and placing cost.....	.2631
	.4512
Topping, \$0.4512 per cubic foot; bid (class a), \$0.52 per cubic foot.	

¹ Includes 10 per cent tare.

Asphaltic binder (class *b*):

1 cubic foot binder stone, at \$1.32 per ton.....	\$0.0635
3.63 ¹ pounds asphaltic cement, at \$10 per ton.....	.0181
Material cost.....	.0816
Manufacturing and placing cost.....	.2631
	<hr/>
	.3447

Binder (class *b*), \$0.3447 per cubic foot; contract price (class *b*) \$0.39 per cubic foot.

Asphaltic binder (class *a*):

1 cubic foot binder stone, at \$1.32 per ton.....	\$0.0635
3.63 ¹ pounds asphaltic cement, at \$31.60 per ton.....	.0573
Material cost.....	.1208
Manufacturing and placing cost.....	.2631
	<hr/>
	.3839

Binder (class *a*), \$0.3839 per cubic foot; bid (class *a*), \$0.41 per cubic foot.

The total cost of minor repairs to sheet asphalt pavements during the year, the same representing the maintenance cost for the year, was \$41,982.41. This cost represented the maintenance of all asphalt streets not under guarantee by contractors—a total yardage of 2,396,063. The cost per square yard per year was therefore about 1.9 cents.

My acknowledgments are due to the employees of this division for the work accomplished by the office during the year.

I transmit herewith the reports of the engineer of bridges, the superintendent of streets, and the superintendent of suburban roads.

Very respectfully,

C. B. HUNT,
Engineer of Highways.

Capt. J. J. LOVING,
*Corps of Engineers, United States Army,
Assistant to Engineer Commissioner, District of Columbia.*

REPORT OF THE SUPERINTENDENT OF STREETS.

WASHINGTON, September 15, 1916.

SIR: I have the honor to submit herewith the annual report of the operations under my charge for fiscal year ended June 30, 1916.

Table H is a summary of work done by day labor under the appropriation for current repairs to streets, avenues, and alleys. The cost of such work was \$74,295.63, including the repair of 5,250 dangerous holes.

Table I is a list of work done under the permit system, wherein the property owners requested the improvement and paid one-half cost, the District paying the other half. The cost of this work was \$14,178.93.

Table K is a list of work done under the assessment system. One-half of the cost of such work is charged against the abutting property. The total cost was \$203,640.07.

Table L is a list of the work paid for from the appropriation for "Replacing sidewalks and curbs around public reservations."

The amount expended was \$11,805.03, which includes \$1,887.77 omitted from 1915 report.

Very respectfully,

H. N. MOSS,
Superintendent of Streets.

THE ENGINEER OF HIGHWAYS.

¹ Ten per cent tare included.

REPORT OF THE SUPERINTENDENT OF SUBURBAN ROADS.

WASHINGTON, D. C., *October 10, 1916.*

SIR: The appropriations expended wholly or in part under this office in the fiscal year ended June 30, 1916, were as follows:

Construction of suburban roads and suburban streets.....	\$76,000
Repairs to suburban roads.....	145,000
Grading streets, alleys, and roads about.....	10,000
Repairs to streets.....	18,000

Itemized statements of these expenditures appear in tables herewith.

The following are the more notable features of the work for the fiscal year:

1. *Construction of suburban roads and suburban streets.*—In addition to streets paved with sheet asphalt, there were constructed from this appropriation about 11,230 square yards of cement roadway (0.63 mile); 20,166 square yards of macadam roadway (1.9 miles); 9,744 square yards of gravel roadway (0.74 mile); grading streets, 25,437 cubic yards, in addition to grading included in above work.

2. *Repairs to suburban roads.*—The repair of trunk lines of travel required the largest part of the appropriation, but it was found that the extensive repairs last year decreased the cost for the same roads for this year. The principal items including those from about \$2,000 upward were approximately as follows: New Cut Road, \$4,000; Massachusetts Avenue extended, \$2,300; Rhode Island Avenue, N.E., \$2,600; Pennsylvania Avenue, S.E., \$3,000; Georgia Avenue, N.W., \$4,400; Bladensburg Road \$4,600; Michigan Avenue \$2,400; Connecticut Avenue \$3,000; Benning Road \$1,800. Approximately \$27,600 was expended from this appropriation for surface treatments with tar and oil, in addition to which \$6,400 was expended for this class of work by the same force from the appropriation for "Repairs to streets." About \$2,600 was expended for water sprinkling, and \$26,304.75 was expended for minor repairs too small to classify.

About 1.1 miles of new first-class macadam roadway, 3 miles of second-class macadam, and 3.2 miles of cinder roads were built from the repair appropriation.

The mileage of improved streets and roads in the District of Columbia, outside of the limits of the city of Washington, not including streets paved with standard pavements—viz., granite block, asphalt block, or sheet asphalt—is as follows:

	Miles.
Bituminous concrete roadway.....	3.75
Bituminous macadam roadway.....	4.36
Cement roadway.....	3.61
Macadamized roadway.....	118.38
Gravel roadway.....	50.26

Although considerable increase was made during the year in the amount of permanent pavement on suburban streets, the annual addition to the macadamized roads is much larger than the area which is paved annually, necessitating larger repair appropriations to take care of the entire system. In addition to this, the amount of wear on each road due to travel increases annually, and repairs become more expensive. For these reasons, all trunk roads carrying heavy travel should be paved with permanent fixed pavements as rapidly as funds can be secured.

Very respectfully,

L. R. GRABILL.

Superintendent of Suburban Roads, District of Columbia.

The ENGINEER OF HIGHWAYS.

Repairs to suburban roads, appropriation 1916.

Job No.	Location.	Work.	Cost.
SECTION 1.—Potomac River to Rock Creek.			
4013	Reno Road NW., between Thirty-ninth and Livingston Streets.	Repair.....	\$489.06
4015	New Cut Road NW., Thirty-sixth Street to Canal Road.....	.....do.....	3,997.38
4016	Pierce Mill Road, between Wisconsin Avenue and Bureau of Standards.	.....do.....	474.00
4017	Ridge Road, between Nebraska Avenue and reservoir.....	.....do.....	1,031.31
4023	Tunlaw Road.....	.....do.....	374.62
4084	Klingie Road, between Rock Creek Park and Cathedral Avenue.	.....do.....	126.19

Repairs to suburban roads, appropriation 1916—Continued.

Job No.	Location.	Work.	Cost.
SECTION 1.—Potomac Rivier to Rock Creek—Continued.			
4092	Rock Creek Ford Road.....	Repair.....	192.37
4093	Pleasant Drive south of McKinley Street.....	do.....	586.82
4094	Klinglie Street NW., between Ridge and Tunlaw Road.....	do.....	36.75
4096	Massachusetts Avenue NW., between Observatory entrance and Wisconsin Avenue.....	do.....	113.67
4103	Nebraska Avenue NW.....	Cleaning gutters.....	98.00
4115	Western Avenue NW., between Pinehurst Circle and Wise Road.....	Repair.....	371.50
4125	West side Belt Road, square 1741.....	Granite block gutters.....	59.43
4129	Thirty-sixth Street NW., north of Reservoir Street and R Street, between Thirty-sixth and Thirty-seventh streets.....	Repair.....	100.12
4143	North side Windom Place, between Wisconsin Avenue and Thirty-ninth Street.....	Cobble gutters.....	186.25
4149	Thirty-seventh Street NW., between New Cut Road and Wisconsin Avenue.....	Repair.....	862.94
4161	Canal Road.....	Cleaning gutters.....	217.00
4170	River Road NW., from Fessenden to District of Columbia line.....	Resurface.....	1,95.720
4174	Thirty-fourth Street NW., between Macomb Street and Woodley Road.....	Repair.....	178.28
4176	Murdock Mill road, River Road to Brandywine Street.....	do.....	66.00
4177	Western Avenue (Wurdeman's fence).....	Removing fence.....	13.50
4195	Grant Road, between Connecticut and Wisconsin Avenues.....	Repair.....	336.56
4212	Rear 2819 Connecticut Avenue NW.....	Relay gutters.....	35.00
4213	Woodley Road, between Connecticut Avenue and Twenty-seventh Street.....	Repair.....	84.07
4226	Upton Street NW., east of Connecticut Avenue.....	do.....	44.63
4186	Brandywine Street NW., east of Thirtieth Street.....	do.....	78.73
4205	McKinley Street NW., Connecticut Avenue to Thirty-ninth Street.....	Repair cement walk.....	96.55
4246	Grant Road, east of Connecticut Avenue.....	Repair.....	257.00
4229	Broad Branch Road, between Rock Creek Park and Chappell Road.....	do.....	669.99
4153	West half block Highland Place, between Thirty-third and Thirty-fourth Streets.....	do.....	147.75
4179	Streets in American University Park.....	do.....	98.75
4206	Thirty-fifth Place NW., between T and U Streets, and U Street, between Wisconsin Avenue and Thirty-fifth.....	Cinders.....	111.00
4248	Chain Bridge.....	Cleaning gutters.....	43.00
4278	Macomb Street NW., Connecticut Avenue to Ross Place.....	Patching.....	33.84
4291	Highland Place, across Ashley Terrace.....	Gutters.....	31.00
4056	Streets in Chevy Chase.....	Repair.....	2,214.35
4065	Canal Road.....	Headley material.....	783.86
4151	Massachusetts Avenue NW., between California and Wisconsin Avenue.....	Repair.....	207.40
4301	Massachusetts Avenue NW., between Thirtieth and Wisconsin Avenue.....	Macadam.....	1,248.95
4302	Massachusetts Avenue NW., from east end of bridge across Rock Creek to Thirtieth Street.....	Resurface.....	1,033.06
4090	Connecticut Avenue NW.....	Patching.....	3,014.78
4091	Wisconsin Avenue NW.....	Repair.....	880.11
4105	Various streets.....	do.....	4,510.07
4014	Watering roads, various streets.....	Watering.....	571.25
4095	Various roads.....	Tarvia.....	4,430.71
4261	do.....	do.....	4,206.02
4150	Twenty-eighth Street NW., Woodley Road to Cathedral Avenue.....	Repair.....	110.75
4172	Pierce Mill Road, between Connecticut Avenue and Bureau of Standards.....	do.....	526.22
4175	Broad Branch Road, between Rittenhouse and McKinley Streets.....	do.....	288.93
.....	Dangerous holes and minor repairs.....	.....	6,086.12
			42,851.26
SECTION 2.—Rock Creek to North Capitol Street and Riggs Road.			
4019	Rock Creek Church Road, between Georgia Avenue and Fifth Street.....	Patching with Headley material.....	384.30
4055	Various roads.....	Oiling.....	1,473.64
4085	East side Georgia Avenue NW., near Freeman's hothouse.....	Open culvert.....	19.50
4126	Maple Avenue NW., between Carroll Street and District of Columbia line.....	Repair.....	185.50
4127	Eastern Avenue NW., between Laurel Avenue and Second Street.....	do.....	427.09
4130	Eastern Avenue NW., between Chestnut and Cedar Streets.....	do.....	632.92
4180	Fourth Street NW., between Butternut and Cedar Streets.....	do.....	516.67
4216	Sixteenth Street NW., between Montague and Madison Streets.....	Extend gutters.....	241.97
4224	South side Carroll Street, between Maple and Willow Streets.....	Repair cement walk.....	28.50
4051	Thirteenth Street NW., between Colorado Avenue and Madison Street.....	Repair.....	39.50
4240	Ninth Street NW., between Allison and Buchanan Streets.....	Placing cinders.....	248.50
4237	Allison Street NW., 300 feet west of Georgia Avenue.....	Surface.....	254.88

Repairs to suburban roads, appropriation 1916—Continued.

Job No.	Location.	Work.	Cost.
SECTION 2.—Rock Creek to North Capitol Street and Riggs Road—Continued.			
4140	Park Place NW., between Lamont Street and alley south of Kenyon Street.	Old material.....	\$198.00
4024	Shepherd Road.....	Repair.....	298.41
4045	Streets in Petworth.....	do.....	1,153.48
4071	Streets in Brightwood Park.....	do.....	183.00
4072	Streets in Takoma Park.....	do.....	763.71
4088	Sauls Subdivision.....	do.....	428.06
4133	Riggs Road, between Rock Creek Church Road and District of Columbia line.	do.....	307.53
4171	Kenyon Street NW., between Nineteenth and Adams Mill Road.	Gutters and old material.	338.62
4202	Rock Creek Church Road, between Upshur and Varnum Streets.	Gutter and sidewalk..	659.32
4228	Upshur Street NW., from New Hampshire Avenue to Rock Creek Church Road.	Gravel.....	82.75
4238	Blair Road NW.....	Repair.....	211.61
4239	Shepherd Street NW., between Georgia Avenue and Fourteenth Street.	do.....	165.00
4249	Kenyon Street NW., between Eighteenth and Nineteenth streets.	Cobble cutters.....	132.75
4289	Chestnut Street, from Blair Road to Eastern Avenue.....	Repair.....	73.74
4290	Military Road, between Georgia Avenue and Rock Creek Ford Road.	do.....	160.26
4066	Daniel Road.....	do.....	714.50
4108	Rock Creek Church Road, Fifth Street to Riggs Road.....	do.....	992.39
4264	Various roads, section 2.....	Tarvia.....	2,264.25
4265	do.....	Oil.....	933.14
4025	Georgia Avenue.....	Repair.....	4,375.71
4039	Various streets.....	Emulsion.....	894.30
4014	do.....	Watering.....	1,108.00
4032	do.....	Tarvia.....	1,937.85
.....	Dangerous holes and minor repairs.....	do.....	9,274.05
SECTION 3.—North Capitol Street to Eastern Branch.			32,103.40
4005	Sixteenth Place, Seventeenth Street, and Franklin Street to Seventeenth Street.	Grading and laying pipe.	\$332.83
4006	Montello Avenue NE., north from Florida Avenue.....	Repair.....	1,143.78
4031	North side Everts Street NE., between Twentieth and Twenty-second Streets.	Cobble gutters.....	148.13
4036	Various roads.....	Oiling.....	1,890.30
4037	Morse Street NE., between West Virginia Avenue and Trinidad Street.	Repair.....	734.37
4048	Douglas Street, from Rhode Island Avenue to Brentwood Road and Montana Avenue.	Surface old material...	246.50
4068	Hamlin Street NE., 250 feet west of Seventh Street.....	Repair.....	100.68
4074	Queens Chapel Road.....	do.....	211.37
4086	Everts Street NE., between Twenty-second Street and Queens Chapel Road.	do.....	138.25
4106	Bates Road NE., between Tenth Street and Sargent Road....	Surface.....	172.88
4109	Perry Street NE., between Twelfth and Thirteenth Streets....	Cobble gutters.....	345.36
4118	Eastern Avenue, between Brentwood Road and Bladensburg Road.	Repair.....	92.25
4119	Sixteenth and Levis Streets NE.....	Pave gutters.....	43.25
4142	South Dakota Avenue, between Carlton and Vista Streets....	Cinders.....	100.00
4168	M Street, east of Bladensburg Road.....	Repair.....	113.32
4201	Central Avenue, between Myrtle and Carlton Streets.....	Cinders.....	46.25
4204	Brentwood Road NE., from Central to Eastern Avenues.....	Repair.....	43.31
4225	Brentwood Road NE., between Rhode Island Avenue and Douglas Street.	do.....	145.12
4227	Carlton Avenue NE., between South Dakota Avenue and Central Avenue.	Grade and cinders....	130.75
4083	Harewood Road, between Michigan Avenue and Rock Creek Church Road.	Repair.....	246.00
4203	North side Irving Street NE., between Thirteenth and Fourteenth Streets.	Cinder walk.....	82.62
4294	Twenty-fifth Street NE., between Girard and Hamlin Streets....	Cinders.....	184.00
4009	Neal Street NE., between West Virginia Avenue and Trinidad Street.	Old material.....	748.05
4247	Brentwood Road NE., east of South Dakota Avenue.....	Repair.....	65.62
4270	M Street NE., between Bladensburg Road and Twenty-eighth Street.	do.....	11.25
4008	Streets in Ivy City.....	do.....	204.79
4029	Streets in Langdon.....	do.....	931.87
4030	Streets in Brookland.....	do.....	2,789.49
4046	Rhode Island Avenue NE., between Second Street and South Dakota Avenue.	do.....	2,084.19
4073	Sargent Road, between Michigan Avenue and District of Columbia line.	do.....	214.08

Repairs to suburban roads, appropriation 1916—Continued.

Job No.	Location.	Work.	Cost.
SECTION 3.— <i>North Capitol Street to Eastern Branch—Continued.</i>			
4132	Thirteenth Street NE., between Kearney and Otis Streets...	Cobble gutters	\$307.12
4160	North side of Rhode Island Avenue NE., between Twentieth and Twenty-second Streets.	Gutters	236.25
4169	South side of Rhode Island Avenue NE., between Mills Avenue and Thayer Street.	do	242.62
4236	Bennings Road NE., end of asphalt to bridge	Repair	905.91
4267	Various roads	Tarvia B.	108.12
4279	Corner Twenty-fourth Street and Rhode Island Avenue NE.	Relay gutter	27.87
4287	Twenty-sixth Street NE., between Irving Street and 400 feet south of Hamlin Street.	Cinders	78.00
4022	Bladensburg Road	Repair	4,601.15
4034	Michigan Avenue NE., between North Capitol Street and District of Columbia line.	do	2,441.34
4014	Various roads	Watering	272.00
4117	do	Emulsion	26.62
4192	Lincoln Road NE., between V Street and Michigan Avenue.	Repair	33.75
Dangerous holes and minor repairs			23,021.41
			3,970.03
			26,991.44
SECTION 4.— <i>East and south of Eastern Branch.</i>			
4035	Gay Street NE., between Division Avenue and St. Catherine's.	Cinders	101.37
4054	Various roads	Oiling	842.32
4069	Eastern Avenue, between St. Catherine's and Sheriff Road...	Grade and cinders	265.13
4107	Streets in Deanwood	Repair	48.00
4128	Morris Road, from Pomeroy Road to Fifteenth Street	Widen roadway	100.00
4131	Minnesota Avenue NE., between Deane Avenue and Sheriff Road.	Repair	257.13
4173	Eastern approach to Pennsylvania Avenue Bridge NE.	do	455.34
4178	Pennsylvania Avenue SE., between Railroad Avenue and Branch Avenue.	Repair with crushed stone.	2,721.64
4152	Trenton Street SE., west of Nichols Avenue	Gravel	137.75
4021	Central Avenue, between Bennings Road and District of Columbia line.	Repair	294.42
4047	Kenilworth Road NE., from Bennings Road to District of Columbia line.	do	43.25
4057	Anacostia Road NE., between Pennsylvania Avenue and Bennings Road.	do	470.75
4076	Walker Road	do	137.34
4089	Various roads	Whitewash barricades.	76.29
4217	Sixteenth Street and Fort Stanton Road	Repair	20.24
4235	Bennings Road at Smithers School	Clean culvert	9.95
4257	Magazine Road SW	Gravel	54.00
4020	Bennings Road, from bridge to District of Columbia line	Repair	880.54
4026	Alabama Avenue SE., between Seventh Street and Stanton Road.	Gravel	280.99
4258	Hayes Street NE., from Minnesota Avenue east of Forty-second Street.	Cinders	162.38
4167	Alabama Avenue, between Wheeler Road and Seventh Street, and Congress Road, between Alabama Avenue and Nichols Avenue.		52.44
4292	Raleigh Place SE., between Seventh Street and Nichols Avenue	Gravel	70.12
4116	Nichols Avenue, from Sheridan Avenue to District of Columbia line.	Repair	1,220.33
4269	Various roads, section 4 SE.	Oil	2,709.54
4268	Various roads, section 4 NE.	do	2,164.56
4272	Pennsylvania Avenue SE., from bridge to Branch Avenue	Macadam	254.75
4014	Various roads	Watering	622.25
4038	Alabama Avenue SE., through Good Hope and Congress Heights.	Emulsion	90.48
Dangerous holes and minor repairs			14,543.30
			6,974.55
			21,517.85

RECAPITULATION.

Section 1	\$42,851.26
Section 2	32,103.40
Section 3	26,991.44
Section 4	21,517.85
Miscellaneous items	123,463.95
Balance	21,511.21
	24.84
	145,000.00

REPORT OF ENGINEER OF BRIDGES.

WASHINGTON, D. C., August 22, 1916.

SIR: I have the honor to submit the following report of the operations under my charge for the fiscal year ended June 30, 1916.

The expenditures from the appropriation for the construction and repair of bridges were as follows:

Bridge No.	Character or work.	Cost.
7	Aqueduct Bridge, painting.....	\$2, 118. 19
204	Division Avenue, constructing reinforced concrete bridge, completing work commenced under 1915 appropriation.....	403. 29
26	Klingle Road, repair.....	351. 65
35	T Street, painting and repairing approaches.....	244. 18
35	West end of M Street Bridge, constructing concrete wall, top of coping.....	28. 03
145	Footbridge over Watts Branch, removing structure and barricading path.....	6. 96
7	Culvert crossing Albemarle Street west of Connecticut Avenue, repairing south end.....	40. 02
7	Aqueduct Bridge, reflooring five south spans.....	3, 271. 00
7	Aqueduct Bridge, reflooring footwalks.....	1, 636. 07
7	Aqueduct Bridge, reflooring four north spans.....	2, 071. 58
62	Livingston Road, refloor.....	165. 15
29	Connecticut Avenue Bridge, 3,291.51 square yards standard asphalt laid and work incidental thereto, \$6,092.55; plumbing, \$80.40.....	6, 172. 95
30	Repairs, railway bridge.....	25. 98
34	.....do.....	3. 85
35	.....do.....	161. 31
		16, 700. 21
	Dangerous holes and minor repairs:	
	July 1-15, 1915.....	\$16. 75
	Aug. 16-31, 1915.....	5. 80
	Sept. 16-30, 1915.....	14. 10
	Oct. 1-15, 1915.....	124. 29
	Oct. 16-31, 1915.....	55. 10
	Nov. 1-15, 1915.....	221. 98
	Nov. 16-30, 1915.....	8. 70
	Dec. 1-15, 1915.....	61. 20
	Dec. 16-31, 1915.....	33. 37
	Jan. 1-15, 1916.....	22. 00
	Jan. 16-31, 1916.....	18. 03
	Feb. 1-15, 1916.....	47. 22
	Feb. 16-29, 1916.....	4. 75
	Mar. 1-15, 1916.....	6. 40
	Mar. 16-31, 1916.....	10. 66
	Apr. 1-15, 1916.....	17. 13
	Apr. 16-31, 1916.....	9. 90
	May 1-15, 1916.....	18. 20
	May 16-31, 1916.....	23. 93
	June 1-15, 1916.....	8. 61
	June 16-30, 1916.....	11. 50
		739. 62
		17, 439. 83
	Contract entered into with L. M. Johnston for constructing culvert at Evarts Street between Twenty-fourth and Twenty-sixth Streets NE.; price bid.....	1, 300. 25
	Salaries, engineer of bridges' office.....	2, 686. 02
	Coal.....	21. 36
	Tools.....	58. 13
	Hire of horse and buggy for Inspector G. Ricker.....	305. 60
	Lumber.....	4, 189. 15
	Miscellaneous.....	107. 12
		26, 107. 46
	Less overhead charges.....	\$59. 34
	Less lumber, etc., purchased from 1915 appropriation.....	3, 367. 92
		3, 427. 26
	Total net expenditures.....	22, 680. 20
	RECAPITULATION.	
	Appropriation.....	22, 000. 00
	Deposit Capital Traction Co.....	990. 69
	Repayment.....	133. 92
		23, 124. 61
	Total net expenditures.....	22, 680. 20
	Balance.....	444. 41
		23, 124. 61

The following bridges were repainted: Bridge No. 7, Aqueduct Bridge, Bridge No. 69, T Street over B. & O. R. R. tracks, painted approaches.

The following bridges were refloored: Bridge No. 7, Aqueduct Bridge, 5 south spans, 4 north spans, and footwalks; Bridge No. 62, Livingston Road.

The Connecticut Avenue Bridge (Bridge No. 29) over Rock Creek was partially paved with asphalt under contract No. 5777 with Warner Quinlan Asphalt Co.

Steel concrete bridge No. 204, Division Avenue, over Watts Branch, under construction at the close of the last fiscal year, was completed July 15, 1915.

The following bridges were repaired: Bridge No. 26, Klinge Road over Rock Creek; Bridge No. 145, Culvert crossing Albemarle Street west of Connecticut Avenue.

Contract No. 6049 was made with L. M. Johnston, of Arlington, Va., for constructing culvert at Evarts Street NE., between Twenty-fourth and Twenty-sixth Streets. Price bid, \$1,300.25.

The Dumbarton Bridge, in line of Q Street over Rock Creek, was completed September 25, 1915, by A. L. Guidone & Co., under contract No. 5520. Cost \$198,784.59.

The grading of Q Street between Rock Creek and Twenty-eighth Street was done under contract No. 5741 with William F. Cush, and was completed September 24, 1915. Cost, \$3,636.97.

The approach of (Q Street Bridge) Dumbarton Bridge, between Twenty-eighth Street and Rock Creek, was paved under contract No. 5926 with the Cranford Paving Co., and was completed December 2, 1915. Cost, \$14,348.87.

Resetting curb and repairing sidewalk of the approach to Dumbarton Bridge between Twenty-eighth and Rock Creek, was done under work order 6043. Cost, \$580.77.

Requisition was placed with John Williams (Inc.), New York City, to furnish and emplace upon the north buffalo pedestal one bronze name plate. Cost, \$120.

A revetment wall was built on the south side of Q Street, 150 feet west from the Dumbarton Bridge. Cost, \$1,199.91.

The Meigs Bridge, in line of Pennsylvania Avenue over Rock Creek, was completed February 8, 1916, by Hardaway Contracting Co., under contract No. 5710. Cost, \$93,363.41.

The reconstruction of the fish wharves was completed May 15, 1916, by W. D. Murray & Co., under contract No. 5724. Cost, \$43,848.79.

The widening of the south approach to the Anacostia Bridge was completed March 31, 1916, by George Hyman, under contract No. 5760. Cost, \$1,947.66.

The fence on the south approach to the Anacostia Bridge was rebuilt and painted, under work order No. 6026, at a cost of \$767.29.

The bumper blocks of the Anacostia Bridge were replaced under work order No. 6033. Cost, \$52.95.

A portion of the retaining wall of the Canal Road near College Pond was constructed by day labor under work order No. 5020.

Contract No. 6083 was made with the Flour City Ornamental Iron Co. to furnish six bronze lamp-posts for the Dumbarton Bridge.

The Dumbarton Bridge is a viaduct crossing Rock Creek in the line of Q Street. The axis of the bridge is the arc of a circular curve having a radius of 474 feet. The length of the bridge, measured along the axis, between the abutments is 261 feet. The elevation of the roadway above the water level of the creek is 75 feet. There are five full centered arches, varying in span from 41 to 43 feet. Each arch consists of two ribs with connecting concrete screen. The piers are 36 feet long. The carriageway is 33 feet wide between curbs and the two footways are each 7 feet wide. The overhanging footways are supported by concrete arches supported by reinforced concrete corbels. The bridge masonry is steel concrete and is trimmed with sandstone of buff color. The lighting of the bridge is by means of six lamps on posts placed in the axis of the bridge, dividing the roadway into two sections. The floor slabs are supported by beams which rest on transverse walls, which in turn rest upon the arch ribs. These walls are crossed braced. The balustrade and the buffalo pedestals are of sandstone. In addition to the ordinary bridge decorations of cut-stone quoins and copings there is a large amount of carving on the balustrades, corbels, and spandrels. The main decorative feature consists in four bronze buffaloes of heroic size on the pedestals at the ends of the bridge. These were furnished by A. Phimister Proctor, of New York. The architectural features were designed by Mr. Glenn Brown of this city; the structural features were designed in the office of the engineer of bridges. Mr. P. M. Taylor was the resident engineer, Mr. I. R. Saum was assistant engineer, and Mr. P. B. Grant was the local inspector. The contractor was A. L. Guidone & Co., of New York.

The original design for this bridge was prepared by Mr. T. C. J. Baily, engineer of bridges, District of Columbia, and Mr. Glenn Brown, architect. Mr. Brown was

engaged to furnish the architectural features of the design. The original design contemplated the construction of a bridge having seven spans, varying between 40 and 43 feet, the axis of the bridge being curved with a radius of 474 feet.

Proposals for the construction of the bridge were requested by advertisement dated April 29, 1913. Four bids were received, the lowest of which exceeded the amount of the funds available, and all were rejected.

The design for the bridge was revised in order that it could be constructed within the limit fixed in the appropriation act which authorized the construction—viz, \$275,000. The number of spans was reduced from seven to five, which was the only change affecting the architectural features.

Structural changes in the design consisted in modification of the reinforced abutments and wings; substitution of two arch ribs with connecting screen arch in each span in place of full arch ring; reinforced concrete beams for support of corbel arches in place of structural steel beams and a number of minor modifications.

The Meigs Bridge crossing Rock Creek, in the line of Pennsylvania Avenue, takes the place of the bridge structure constructed as a portion of the Washington Aqueduct in 1859, and which was unique in that the roadway was supported by two cast-iron pipes, which were emplaced as arches having spans 200 feet with 21 feet rise. The new bridge consists of five arch ribs, the actual spans of each being 204 feet and the rise 31 feet; these are founded on ledge rock and are connected by thin screen arches. The 48-inch mains remain in original position and are situated between the center and intermediate arch ribs. The roadway and footways are supported by means of concrete beams resting on columns and the outside spandrel walls. The showing faces of the bridge and the balustrades are of Mount Airy granite. The length of the bridge at roadway level is 276 feet, the width is 70 feet, the roadway width is 50 feet, and there are two footways, each 10 feet in width. There is a double-track underground trolley railway in the middle of the roadway. The width of span between false abutments is 164 feet. The live loads provided for were:

Footway: 100 pounds square foot for slab, 75 pounds square foot for beams.

Roadway: 100 pounds square foot for span outside of concentrated loads. Concentrated loads, 15,000 pounds on each of 4 wheels, spaced 6 by 12 feet, covering area 12 by 36 feet; also 12,000 pounds on each of 8 wheels, spaced 5 by 6 feet, 19 by 6 feet, 22 by 6 feet in space 12 feet wide.

Stresses: Direct compression, 500 pounds square inch for 1:1½:3½ concrete; bending compression, 750 pounds square inch for 1:1½:3½ concrete; bending compression, 650 pounds square inch for 1:2:4 concrete; shear compression, 40 pounds square inch for plain concrete; shear compression, 120 pounds square inch for reinforced concrete; steel tension, 16,000 pounds square inch.

The design for the bridge was prepared in the office of the engineer of bridges; the details were worked up by Assistant Engineer P. M. Taylor, assisted by Mr. I. R. Saum. Mr. Taylor was also the resident engineer during construction, assisted by Mr. D. L. Dutton; Mr. J. P. Bouscaren was the local inspector. The contractor was the Hardaway Contracting Co., of Columbus, Ga.

The fish wharves, completed under contract with W. D. Murray & Co., are of reinforced concrete construction supported by piling. The base of the concrete walls are at mean tide elevation.

The top of the concrete floor slab is finished with troweled surface. The design of the wharves was prepared in this office; the details were worked up by Mr. W. A. Draper, assistant engineer.

Provision should be made for the following: Replacement of the Calvert Street Bridge because of inadequate capacity; replacement of timber floors of M and P Street Bridges across Rock Creek by asphalt floors upon buckle plates. In addition to the above the smaller bridges with wooden floors should be replaced as rapidly as possible from the appropriations for constructing bridges.

Very respectfully,

D. E. McComb,
Engineer of Bridges.

The ENGINEER OF HIGHWAYS.

TABLE A.—*Street railroads in operation in District of Columbia, June 30, 1916.*

Name of company.	Underground electric.		Overhead electric.		Total.
	Double track.	Single track.	Double track.	Single track.	
	<i>Miles.</i>	<i>Miles.</i>	<i>Miles.</i>	<i>Miles.</i>	
Washington Railway & Electric Co.....	23.09	6.34	26.77	3.99	60.19
Capital Traction Co.....	20.19	3.60	3.57	.....	27.36
Washington & Virginia Co.....	.....	.46	.....	.....	.46
East Washington Traction Co.....	.....	.....	.....	.50	.50
Washington Interurban Co.....	.....	.....	.....	2.65	2.65
Washington & Maryland Co.....	.....	.....	.....	2.33	2.33
Total.....	43.28	10.40	30.34	9.47	93.49
Tracks used in common by Capital Traction Co. and Washington Railway & Electric Co.....	1.55	.....	.....	.....	1.55
Tracks used in common by Washington Railway & Electric Co. and Washington & Virginia Co.....	.70	.....	.....	.....	.70
Total.....	45.53	10.40	30.34	9.47	95.74

TABLES B AND C.—*Character and extent of roadway pavements July 1, 1916.*

SQUARE YARDS.

Section.	Asphalt.	Asphalt block.	Asphaltic concrete, concrete base.	Asphaltic concrete, stone base.	Cement concrete.	Granite and rubble.	Vitrified block.
Northwest, city.....	1,728,128	26,455	9,674	6,372	1,218	139,909	18,000
Northeast, city.....	350,706	194,748	3,127	.....	.....	18,289	3,882
Southeast, city.....	200,953	234,749	8,019	4,082	.....	42,872	.....
Southwest, city.....	241,439	38,222	13,535	.....	4,210	172,955	3,138
Georgetown.....	149,676	23,075	4,144	905	.....	39,881	515
Northwest, suburban.....	264,209	79,087	25,855	36,680	46,677	23,945	.....
Northeast, suburban.....	58,347	6,925	14,354	.....	16,550	5,971	.....
Southeast, suburban.....	14,494	.....	.....	3,049	.....	1,000	.....
Total.....	3,007,952	603,261	78,708	51,088	68,655	444,822	25,535

Section.	Cobble.	Macadam (estimated).	Gutters on asphalt streets.	Gutters on asphaltic concrete streets.	Pavements maintained by street railroads.	Total.
Northwest, city.....	31,826	54,000	113,572	1,128	281,771	2,412,053
Northeast, city.....	.....	85,500	28,284	231	69,316	753,583
Southeast, city.....	13,122	60,000	14,351	898	48,328	627,374
Southwest, city.....	11,233	29,000	22,071	1,254	56,820	593,877
Georgetown.....	12,618	4,000	5,220	498	31,816	272,848
Northwest, suburban.....	.....	1,345,329	23,020	5,871	54,668	1,905,341
Northeast, suburban.....	.....	331,848	4,881	1,049	9,000	448,925
Southeast, suburban.....	.....	52,127	5,633	272	7,370	83,945
Total.....	68,799	1,961,304	217,032	11,201	559,089	7,097,446

TABLES B AND C.—*Character and extent of roadway pavements July 1, 1916—Contd.*
MILEAGE.

Section.	Asphalt.	Asphalt block.	Asphaltic concrete, concrete base.	Asphaltic concrete, stone base.	Cement concrete.	Granite and rubble.
Northwest, city.....	88.91	1.57	0.51	0.24	0.08	7.20
Northeast, city.....	18.17	8.66	.19			.91
Southeast, city.....	10.74	11.72	.43	.17		2.50
Southwest, city.....	13.17	2.25	.68		.22	8.83
Georgetown.....	8.74	1.51	.49	.06		2.71
Northwest, suburban.....	14.61	4.25	1.31	2.00	2.56	1.13
Northeast, suburban.....	3.87	.63	.97		.89	.61
Southeast, suburban.....	1.21			.21		.04
Total.....	159.42	30.59	4.58	2.68	3.75	23.93

Section.	Vitrified block.	Cobble.	Macadam (estimated).	Gravel and unimproved (estimated).	Total.
Northwest, city.....	0.80	1.50	2.66	3.12	106.59
Northeast, city.....	.24		4.80	5.00	37.97
Southeast, city.....		.66	2.90	8.19	37.31
Southwest, city.....	.27	.51	1.33	3.00	30.26
Georgetown.....	.03	.64	.14	.76	15.08
Northwest, suburban.....			83.77	58.66	168.29
Northeast, suburban.....			23.24	46.39	76.60
Southeast, suburban.....			3.94	36.19	41.59
Total.....	1.34	3.31	122.78	161.31	513.69

TABLE G.—*Charges against street railroads (work in connection with paving, resurfacing, and minor repairs) for fiscal year ending June 30, 1916.*

CAPITAL TRACTION CO.

Street.	From—	To—	Section.	Amount.
I.....	First.....	New Jersey.....	Northwest..	\$14.56
L.....	Seventh.....	Ninth.....	Southwest..	35.24
B.....	New Jersey.....	Second.....	Southeast..	572.91
Pennsylvania.....	Second.....	Eighth.....	do.....	96.50
Twenty-fifth.....	K.....	Pennsylvania.....	Northwest..	252.74
Minor repairs on various streets, District of Columbia, repair force.....				1,064.45
Total.....				2,036.40

WASHINGTON RAILWAY & ELECTRIC CO.

Connecticut.....	H.....	Eye.....	Northwest..	\$12.73
Eye.....	Eleventh.....	Thirteenth.....	Southeast..	25.71
H.....	Twelfth.....	Fifteenth.....	Northeast..	378.11
K.....	North Capitol.....	First.....	Northwest..	358.15
N.....	do.....	do.....	Northeast..	14.50
North Capitol.....	Eleventh.....	Fourteenth.....	Northwest..	9.28
T.....	Pierce.....	M.....	Northeast..	195.87
Second.....	Second.....	Todd.....	do.....	12.14
Sixth.....	B.....	Missouri.....	Northwest..	41.54
Ninth.....	P.....	S.....	do.....	483.00
Minor repairs on various streets, District of Columbia, repair force.....				846.54
10,668 cubic feet old material in bulk at portable plant.....				2,133.60
4,272 cubic feet asphaltic concrete in bulk at portable plant.....				961.20
9,400 pounds asphaltic cement in bulk at portable plant.....				79.61
Total.....				5,725.51

WASHINGTON AND VIRGINIA CO.

Minor repairs on various streets, District of Columbia, repair force.....	\$5.57
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TABLE E.—Statement of contract work on

Street or avenue.	From—	To—	Section.	Kind of pavement.	Date work completed.	Contract work on					
						Square yards.	Length.	Contract number.	Price per square yard.	Grading.	Old cobble removal.
W.	Eleventh.	Twelfth.	Northwest.	Asphalt.	Aug. 14, 1915	796.95	<i>Lin. feet.</i> 241	5777	\$1.49	<i>Cu. yds.</i> 228	<i>Sq. yds.</i> 1,300
E.	Nineteenth.	Twentieth.	do.	do.	Aug. 11, 1915	1,637.98	490	5777	1.49	185	1,300
Tenth.	Pennsylvania.	P.	do.	do.	Sept. 28, 1915	3,846.69	743	5777	1.49	327	1,300
Twenty-seventh.	Dumbarton.	B.	do.	do.	Nov. 29, 1915	1,768.77	596	5777	1.49	338	1,300
Seventh.	New York.	Q.	do.	do.	Oct. 4, 1915	9,594.35	2,927	5777	1.49	120	1,300
Florida.	Seventh.	Ninth.	do.	do.	Nov. 17, 1915	1,687.54	576	5777	1.49	223	1,300
Q.	Rock Creek.	Twenty-eighth.	do.	do.	Dec. 2, 1915	5,470.59	1,558	5926	1.57	657	1,300
Hanover.	North Capitol.	Westward.	do.	Concrete.	Nov. 25, 1915	1,218.19	436	5850	.80	249	1,300
K.	Seventh.	Tenth.	Northeast.	Asphalt.	Aug. 26, 1915	4,490.72	1,113	5777	1.49	1,323	1,300
C.	Thirteenth.	Fifteenth.	do.	do.	Oct. 11, 1915	4,097.48	1,242	5777	1.49	1,375	1,300
Fourteenth.	East Capitol.	North Carolina.	do.	do.	Dec. 20, 1915	1,597.52	613	5777	1.49	620	1,300
A.	North Carolina.	Fifteenth.	do.	do.	do.	3,034.19	983	5777	1.49	1,058	1,300
Eye.	Eleventh.	Thirteenth.	Southeast.	do.	Sept. 11, 1915	3,363.24	968	5777	1.49	628	1,300
Thirteenth.	Pennsylvania.	Potomac.	do.	do.	do.	2,721.44	819	5777	1.49	800	1,300
Do.	B.	C.	do.	do.	do.	2,974.33	788	5777	1.49	897	1,300
Fourteenth.	B.	East Capitol.	Massachusetts.	Asphalt-block.	June 2, 1916	2,110.10	674	5935	1.52	666	1,300
Twelfth.	B.	Pennsylvania.	do.	do.	Dec. 23, 1915	7,340.91	1,756	5935	1.52	2,141	1,300
Union.	M.	O.	Southwest.	Concrete.	Nov. 8, 1915	4,209.61	1,193	5850	.80	306	1,300
Eye.	Seventh.	Ninth.	do.	Asphalt.	May 26, 1916	1,803.18	604	5777	1.49	597	1,300
N.	South Capitol.	Third.	do.	do.	Nov. 30, 1915	5,816.61	1,865	5777	1.49	597	1,300
Highway Bridge.	Approaches	Potomac Park.	do.	do.	Aug. 11, 1915	754.31	.....	5658	1.78	452	1,300
Do.	do.	do.	Potomac Park.	Granite block.	Nov. 13, 1915	2,663.33	.....	5808	1.48	500	1,300
Q.	Rock Creek.	Twenty-eighth.	Northwest.	Grading.	Sept. 24, 1915	.....	.....	5741	.28	11,969	1,300
						Asphalt.	55,455.89	16,166	.....	.....	.....
						Asphalt-block.	9,451.01	2,430	.....	.....	.....
						Concrete.	5,427.89	1,629	.....	.....	.....
						Granite block.	2,663.33	.....	.....	.....	.....
Total.						72,998.03	20,225	.....	.....	26,260	31,700

1 Granite block.

2 Vitrified block.

3 Cement

TABLE E.—Statement of contract work on streets and avenues for year ending June 30, 1916.

From—	To—	Section.	Kind of pavement.	Date work completed.	Contract work.										Material.				Cost of material.	Cost of extra work.	Amount of contract.	Total cost of work.	Contractor.
					Square yards.	Length.	Contract number.	Price per square yard.	Grading.	Old cobble removed.	Old curb removed.	Curb set.	Curb reset.	Vitrified block gutters.	Vitrified block.	8 by 8-inch curb.	6 by 20-inch curb.	Circular curb.					
Eleventh.....	Twelfth.....	Northwest.....	Asphalt.....	Aug. 14, 1915	796.95	241	5777	\$1.49	228	90	145	386.75	133.54	77.29	3,360	347.54	40.38		\$381.12		\$2,051.74	\$2,432.86	Warner-Quinlan Asphalt Co.
Nineteenth.....	Twentieth.....	do.....	do.....	Aug. 11, 1915	1,637.98	490	5777	1.49	185	1,320	138	6.28	850.19	117.64	5,110		6.28	120.03			3,430.19	3,550.22	Do.
Pennsylvania.....	B.....	do.....	do.....	Sept. 28, 1915	3,846.69	743	5777	1.49	327	13,020	1,351	1,297.12	146.95	227.49	9,500	1,118.38	181.59	1,251.54			8,958.48	10,210.02	Do.
Dumbarton.....	P.....	do.....	do.....	Nov. 29, 1915	1,708.77	596	5777	1.49	338	375		20.96	1,124.03	140.27	5,850		19.02	140.84			3,537.39	3,687.23	Do.
New York.....	Q.....	do.....	do.....	Oct. 4, 1915	9,594.35	2,927	5777	1.49	120	110,217	3,430	3,432.54	1,621.51	718.16	34,553	3,354.13	91.06	3,411.83			23,519.94	26,931.77	Do.
Seventh.....	Ninth.....	do.....	do.....	Nov. 17, 1915	1,687.54	576	5777	1.49	233	1,687	18	33.28	1,013.91	186.08	8,000		44.55	224.38			4,177.02	4,401.40	Do.
Rock Creek.....	Twenty-eighth.....	do.....	do.....	Dec. 2, 1915	5,470.59	1,598	5926	1.57	657		160	3,825.68	107.15	404.64	17,700	3,173.06	166.47	2,979.26	\$2,218.54		14,348.87	19,546.67	Cranford Paving Co.
North Capitol.....	Westward.....	do.....	Concrete.....	Nov. 25, 1915	1,218.19	436	5850	.80	249	296	14	12.54	798.23	11.10	500		16.82	26.07			1,807.16	1,833.23	G. B. Mullin Co.
Seventh.....	Tenth.....	Northeast.....	Asphalt.....	Aug. 26, 1915	4,490.72	1,113	5777	1.49	1,323	49	67	993.77	582.29	263.00	11,180	996.33		1,005.41			9,025.77	10,031.18	Warner-Quinlan Asphalt Co.
Thirteenth.....	Fifteenth.....	do.....	do.....	Oct. 11, 1915	4,097.48	1,242	5777	1.49	1,375	200		1,742.56	570.25	322.89	14,927	1,618.68	123.60	1,673.48			8,601.82	10,275.30	Do.
East Capitol.....	North Carolina.....	do.....	do.....	Dec. 20, 1915	1,597.52	613	5777	1.49	620	13		20.50	702.02	125.42	5,779	14.80	9.42	149.43			3,411.13	3,560.56	Do.
North Carolina.....	Fifteenth.....	do.....	do.....	do.....	3,034.19	983	5777	1.49	1,058	50		742.34	517.24	243.15	7,841		747.24			6,168.22	7,007.33	Do.	
Eleventh.....	Thirteenth.....	Southwest.....	do.....	Sept. 11, 1915	3,363.21	968	5777	1.49	628	94	90	234.78	755.61	224.42	9,540		238.32			423.89	6,301.25	6,725.14	Do.
Pennsylvania.....	Potomac.....	do.....	do.....	do.....	2,721.44	819	5777	1.49	800	506		44.80	649.27	196.11	8,460		28.95	15.70			5,380.90	5,608.61	Do.
B.....	C.....	do.....	do.....	June 2, 1916	2,974.33	788	5777	1.49	897	689	128	1,320.63	180.46	7,799			566.10			695.75	4,665.04	5,360.79	Washington Asphalt Block & Tile Co.
East Capitol.....	Massachusetts.....	do.....	Asphalt-block.....	May 20, 1916	2,110.10	674	5935	1.52	666	228	306	582.45	583.51	171.18	7,900			15.75			404.04	15,922.27	Do.
B.....	Pennsylvania.....	do.....	do.....	Dec. 23, 1915	7,340.91	1,756	5935	1.52	2,141	1,360	273	3,211.77	412.98	18,200			62.78			64.98	5,892.12	5,957.10	G. B. Mullin Co.
M.....	O.....	Southwest.....	Concrete.....	Nov. 8, 1915	4,299.61	1,193	5850	.80	306	5,496	998	2,337.64		1,076.89	6,100		135.42			4,182.03	4,317.45	Warner-Quinlan Asphalt Co.	
Seventh.....	Ninth.....	do.....	Asphalt.....	May 26, 1916	1,803.18	604	5777	1.49	597	219	263		3,347.90	437.71	18,600		412.02			11,887.15	12,300.07	Do.	
South Capitol.....	Third.....	do.....	do.....	Aug. 11, 1915	754.31	1,865	5777	1.49	597	5,136		17.40		302.68	14,185		17.27			335.92	6,225.15	6,980.81	Cranford Paving Co.
Approaches.....	Potomac Park.....	do.....	Granite block.....	Nov. 13, 1915	2,663.33		5808	1.48	500	480		4,699.10		21.00	990					3,176.50	9,925.51	13,123.99	R. J. Beall Construction Co.
do.....	do.....	do.....	Grading.....	Sept. 24, 1915			5741	.28	11,969											285.65	3,351.32	3,636.97	William F. Cush.
Rock Creek.....	Twenty-eighth.....	Northwest.....	Asphalt.....		55,455.89	16,166																	
			Asphalt-block.....		9,451.01	2,430																	
			Concrete.....		5,427.80	1,629																	
			Granite block.....		2,663.33																		
					72,998.03	20,225			26,263	31,525	7,386	20,430.50	19,138.44	4,957.43	215,174	10,622.92	1,597.43	795.87	15,107.25	11,905.84	165,915.16	192,928.25	

1 Granite block.

2 Vitrified block.

3 Cement curb.

4 Paid from 1915 appropriation.

5 Asphalt block.



Street or avenue.	From~	To—	Section.	Kind of pavem
Sherman.....	Columbia.....	Park.....	Northwest	Asphalt.....
Connecticut.....	Avenue.....	Bridge.....	do.	do.
Georgia.....	Irving.....	Rock Creek Church	do.	do.
Nichols.....	Anacostia Bridge.	Sheridan.....	Southeast	do.
V.....	Lincoln.....	Second.....	Northeast	Concrete.
W.....	North Capitol.	First.....	Northwest	do.
Kenyon.....	Park Place.....	Georgia.....	do.	do.
Monroe.....	Twelfth.....	Thirteenth.	Northeast	Macadam.
Seventeenth.....	Minnesota.....	Good Hope.....	Southeast	do.
Myrtle.....	South Dakota.	Central.....	Northeast	do.
Sheriff Road.....			do.	do.
Pennsylvania.....	Branch.....	Alabama.....	Southeast	Gravel.....
Seventh.....	Alabama.....	Nichols.....	do.	do.
Albermarle.....	Connecticut.....	Reuo.....	Northwest	Grading.
Division.....	Washington.....	Deane.....	Northeast	do.
Twenty-fourth.....	Hamlin.....	Irving.....	do.	do.
				Asphalt.....
				Concrete.....
				Macadam.....
				Gravel.....
				Second-class mater
Total.....				

¹ Granite block.

² Vitrified block. \$1,256.53 charged to paving highway bridge app

Broken stone for macadam furnished from District quarry; freight, hauling, spreading, and rolling by day :

64838°—16. (To face page 14.) No. 2.

TABLE F.—Repairs to asphalt pavements for year ending June 30, 1916, under contract with Cranford Paving Co., No. 5555.

Street or Avenue.	From—	To—	Section.	Kind of pavement.	Contract work.												Material.				Cost of material.	Cost of assessment and permit work.	Cost of contract work.	Total cost of work.	Repairs completed.	Character of pavement.		
					New pavement.	Resurfacing.	Base.	Binder.	Grading.	Concrete base removed.	Bituminous base removed.	Old curb removed.	Curb reset.	Curb set.	Vitrified-block gutters.	Vitrified block.	8 by 8 inch curb.	6 by 20 inch curb.	Circular curb.									
					Sq. yds.	Sq. yds.	Cu. yds.	Cu. ft.	Cu. yds.	Cu. yds.	Cu. yds.	Lin. ft.	Lin. ft.	Lin. ft.	Sq. yds.	Number.	Lin. ft.	Lin. ft.	Lin. ft.									
New Jersey.	Second.	Second.	Southeast.	Asphalt.	2,246.58	1,049.15	75.32	1,350.98	56.00	164.43	637.00	31.00	795.62	21.23	143.98	6,272	349.61	10.25	15.75	\$164.90		\$7,927.08	\$8,091.98	Aug. 2, 1915	Evans coal tar.			
H.			Northwest.	do.	2,304.69	121.86	6.68	236.00		67.30	757.00	387.61	268.6	368.69	105.92	4,660			26.30	393.07	\$154.67	6,392.12	6,939.86	Aug. 24, 1915	Bituminous base.			
Fifth.			do.	do.		928.54	54.03	1,368.00		10.20		9.71	299.35	9.42	62.05	2,700				69.83		1,528.54	1,598.37	July 14, 1915	Asphalt.			
North Capitol.	First.		do.	do.		1,236.93	98.25	1,748.00	40.00	6.75	73.25		344.65		46.25	4,900				108.78		2,198.68	2,307.46	June 24, 1915	Coal-tar distillate.			
Twelfth.	Fifteenth.		Northwest.	do.		3,712.71	254.08	5,409.00	74.61	117.30		221.35	204.50	227.65	235.93	10,300	228.73			414.16		6,232.77	6,761.61	May 17, 1915	Asphalt.			
North Capitol.	First.		Northwest.	do.	1,239.32	2,010.67	195.30	2,528.40	274.10	440.64		1,288.00	15.78	1,263.54	290.39	11,200	1,642.91		66.09	1,591.57	1,732.68	6,979.64	9,303.89	July 22, 1915	do.			
Eighteenth.	Pennsylvania.		do.	do.		1,310.81	51.50	2,090.00	6.41	46.90		17.00	701.50	29.77	98.34	4,503	10.00		19.92	128.41		2,428.63	2,557.04	Sept. 8, 1915	do.			
First.	New Jersey.		do.	do.		818.84	410.79	20.70	68.80	48.70	15.30		166.40	72.00	23.46	68.70			57.75	131.68		2,671.59	2,803.27	June 18, 1915	Scharff coal tar.			
Eight.	North Capitol.	First.	Northwest.	do.		717.71	22.22	1,102.00	24.00	12.50			168.17		70.71	3,200				71.04		1,164.56	1,235.60	July 30, 1915	Asphalt.			
North Capitol.	First.		Northwest.	do.	4,616.01	23.05		34.57	271.00	267.80	635.10	41.00	843.44	9.46	237.04	10,200			9.42	236.33		10,765.87	11,032.00	June 1, 1915	Bituminous base.			
Eleventh.	Fourteenth.		Northwest.	do.		3,994.35	305.60	5,255.34	12.00	23.00		15.22	606.34	830.63	607.54	138.31	14,800	581.59		31.50	803.65	259.11	7,064.88	8,127.64	Aug. 7, 1915	Asphalt.		
Pierce.	M.		do.	do.		220.42	784.52	73.52	1,224.36	6.00	9.90		150.04		97.00					76.15		1,997.86	2,074.01	Jun. 23, 1915	do.			
Second.	Eight.		Southeast.	do.	2,099.03	10,123.23	506.58	16,527.80	32.50	135.50		430.00	2,427.40	2,428.27	267.46	15,240	2,180.78		278.18	2,279.55	1,069.49	20,409.55	23,588.59	Nov. 22, 1915	do.			
Sixteenth.	Seventeenth.		Northwest.	do.		1,556.42	1.30	1.95	33.20			492.80	316.00		223.08	345.85				433.06		4,112.87	4,725.96	July 15, 1915	Scharff coal tar.			
Second.	Third.		Northwest.	do.		1,136.48	54.61	10.88	17.50	16.70	204.50	108.00	719.92	18.90	92.28	3,975				18.84		2,774.39	2,879.48	Aug. 3, 1915	Bituminous base.			
Second.	Third.		do.	do.		889.88	10.21	10.08	15.31	41.00	37.66	188.80	80.00	648.73	23.57	86.70				23.97		2,246.43	2,351.25	Aug. 4, 1915	do.			
Second.	Rhode Island.		Northwest.	do.		149.10	2,922.10	151.38	3,469.95	23.00	5.00		721.00	159.71	721.36					34.54		4,622.13	5,478.34	May 21, 1915	Asphalt.			
Todd.	Todd.		Northwest.	do.		707.06	61.83	6.72	119.33				70.00	380.03	15.78	47.32				15.78		1,731.98	1,791.25	Aug. 4, 1915	Bituminous base.			
Pennsylvania.	North Carolina.		Southeast.	do.		766.30				29.00	816.50		372.30	25.27	389.12	50.20	2,160			35.62		1,552.34	2,080.21	Nov. 20, 1915	Asphalt block.			
M.	O.		Northwest.	do.		228.52	3,237.63	254.12	3,890.72	55.00	46.00	25.00	70.60	1,850.13	82.35	265.34	11,450			50.24		6,361.63	6,692.00	July 21, 1915	Asphalt.			
Florida.	Missouri.		do.	do.		1,814.29	568.68	29.00	698.57	39.00	13.50	329.20	410.00	1,235.88	50.24	180.52				53.38		4,954.80	5,189.36	July 7, 1915	do.			
P.	S.		do.	do.		696.97	18.24	864.50		5.36			116.75	80.30	161.13	59.64	2,500			18.84		1,216.66	Aug. 25, 1915	do.				
Pennsylvania.	K.		do.	do.		147.51	4,608.18	42.57	6,768.08	45.00	145.00	5.27	56.00	1,522.57	75.55	460.67	19,350			61.67		7,239.19	7,751.85	Apr. 28, 1915	do.			
Pennsylvania.	H.		do.	do.		1,690.95	67.90	14.01	101.85		36.07	708.00		527.24	6.30	98.15				6.28		5,310.53	5,409.58	Aug. 11, 1915	Coal tar.			
Pennsylvania.	H.		do.	do.		819.28	123.65		174.80	137.50	71.20	113.50	357.59	92.55	357.65	49.15	2,100			37.68		6,135.57	2,308.66	Aug. 16, 1915	do.			
New Hampshire.	Massachusetts.		do.	do.		4,631.41	51.59	12.90	71.90	135.00	133.80	975.72	898.83	644.58	873.25	354.84	14,700			9.42		1,027.57	398.55	July 6, 1915	Vulcanite coal tar.			
Pennsylvania.	K.		do.	do.		711.84	116.06	7.06	71.85	40.00	45.50		145.50	54.00	668.12	57.76	102.75	4,430			61.82		2,012.56	2,175.82	Aug. 26, 1915	Bituminous base.		
Total.					28,883.73	38,977.96	2,221.45	55,848.06	1,440.52	2,782.31	5,942.30	8,762.48	15,902.21	8,221.96	3,986.10	180,700	7,712.15	10.25	942.41	10,968.17	3,559.85	135,194.09	149,722.11					

¹ \$192.78 chargeable to sidewalks and curbs.
² \$549.77 chargeable to sidewalks and curbs.

³ Square yards, asphalt block.
⁴ \$82.06 chargeable to sidewalks and curbs.

⁵ \$5,700 chargeable to 1915 appropriation.
⁶ \$67.54 chargeable to sidewalks and curbs.

Work done by municipal plant (minor repairs, 1916):

95,628 cubic feet old material, at 36 cents..... \$34,426.08
2,275 cubic feet topping, at 42 cents..... 955.50
17,145 cubic feet asphaltic concrete, at 38½ cents..... 6,600.83

Total..... 41,982.41

TABLE F.—Repairs to asphalt pavements for year ending June 30, 1916, under contract with Cranford Paving Co., No. 5555.

Location.	Kind of pavement.	Contract work.											Material.				Cost of material.	Cost of assessment and permit work.	Cost of contract work.	Total cost of work.	Repairs completed.	Original pavement.			
		New pavement.	Resurfacing.	Base.	Binder.	Grading.	Concrete base removed.	Bituminous base removed.	Old curb removed.	Curb reset.	Curb set.	Vitrified-block gutters.	Vitrified block.	8 by 8 inch curb.	6 by 20 inch curb.	Circular curb.						Character of pavement.	Year laid.	Year resurfaced.	Contractor.
		Sq. yds.	Sq. yds.	Cu. yds.	Cu. ft.	Cu. yds.	Cu. yds.	Cu. yds.	Lin. ft.	Lin. ft.	Lin. ft.	Sq. yds.	Number.	Lin. ft.	Lin. ft.	Lin. ft.									
theast	Asphalt	2,246.58	1,049.15	75.32	1,350.98	56.00	184.43	637.00	31.00	795.62	21.23	143.98	6,272	21.23	10.25	15.75	\$164.90		\$7,927.08	\$8,091.98	Aug. 2, 1915	Evans coal tar	1873	1892	C. E. Evans.
thwest	do.	2,304.69	121.86	6.68	236.00		67.30	737.00	387.61	268.36	368.69	105.92	4,909	349.61		26.30	393.07	\$154.67	6,392.12	6,939.86	Aug. 24, 1915	Bituminous base	1875	1894	Do.
do.	do.		928.54	54.03	1,368.00		10.20		9.71	269.35	9.42	62.05	2,700			9.42	69.83		1,598.37	1,598.37	July 14, 1915	Asphalt	1878	1891	W. R. Davis.
do.	do.		1,236.93	98.25	1,748.00	40.00	6.75	73.25		344.65		46.25	4,909				108.78		2,198.68	2,307.46	June 24, 1915	Coal-tar distillate	1887		Barber Asphalt Paving Co.
theast	do.		3,712.71	254.08	5,409.00	74.61	117.30		221.35	204.50	227.65	235.93	10,309	228.73			414.16	114.68	6,232.77	6,761.61	May 17, 1915	Asphalt	1883	1892	H. L. Cranford.
thwest	do.	1,239.32	2,010.67	195.30	2,528.40	274.10	440.64	1,288.00	15.78	1,263.54	260.39	11,239	1,642.91			66.09	1,591.57	1,732.68	6,979.64	9,303.89	July 22, 1915	do.	1895		Cranford Paving Co.
do.	do.		1,310.84	51.30	2,090.00	6.41	46.90		17.00	701.50	29.77	98.34	4,503			19.92	128.41		2,428.63	2,557.07	Sept. 8, 1915	do.	1881		Barber Asphalt Paving Co.
do.	do.	818.84	410.69	20.70	648.80	48.70	15.30	106.40	72.00	23.46	74.57	66.70	3,200			57.75	131.98		2,671.59	2,803.27	June 18, 1915	Scharif coal tar	1875		R. D. Smith.
do.	do.		747.71	22.22	1,102.00	24.00	12.50			168.17		70.71	3,200				71.04		1,161.56	1,235.60	July 30, 1915	Asphalt	1885		Barber Asphalt Paving Co.
theast	do.	4,616.01	23.05		31.57	271.00	267.80	635.10	41.00	848.44	9.46	237.04	10,200			9.42	236.33		10,795.67	11,032.00	June 18, 1915	Bituminous base	1889		Cranford Paving Co.
thwest	do.		3,994.35	305.60	5,255.34	12.00	23.00	15.22	606.34	830.63	607.54	138.31	14,800	581.59		31.50	803.65	259.11	7,064.88	8,127.64	Aug. 7, 1915	Asphalt	1880		J. S. Baldwin.
do.	do.	220.42	784.52	73.52	1,224.36	6.00	9.90	150.04		97.00		220.42	3,430				76.15		1,997.86	2,074.01	Jun. 23, 1915	do.	1891		Barber Asphalt Paving Co.
theast	do.	2,099.03	10,123.23	506.38	16,527.80	32.50	135.50	430.00	2,427.40	2,569.54	2,428.27	267.46	15,240	2,180.78		278.18	2,279.55	2,106.99	20,409.55	23,758.59	Nov. 22, 1915	do.	1879		J. S. Baldwin.
thwest	do.	1,536.42	1.30		1.95		402.80		316.00	223.08	345.86	176.04	7,700				433.06	150.03	4,112.87	4,725.96	July 15, 1915	Scharif coal tar	1875	1895	W. C. Murdock.
theast	do.	1,435.48	54.61	10.38	76.00	17.50	16.70	204.50		716.92	18.90	92.28	3,973				105.09		2,771.39	2,879.48	Aug. 3, 1915	Bituminous base	1889		H. L. Cranford.
do.	do.	889.88	10.21	10.08	15.31	41.00	37.66	188.80	80.00	648.73	23.57	86.70	3,750				23.97		2,246.43	2,351.25	Aug. 4, 1915	do.	1889		Do.
thwest	do.	119.10	2,922.10	151.38	3,469.95	23.00	5.00		721.00	159.71	721.36			654.04		34.54	552.95	303.26	4,622.13	5,478.34	May 21, 1915	Asphalt	1895		Cranford Paving Co.
theast	do.	707.06	61.83	6.72	119.33		92.50		70.00	380.03	15.78	47.32	2,009			15.78	59.27		1,731.98	1,791.25	Aug. 4, 1915	Bituminous base	1888		George Truesdall.
theast	do.	766.30		.60		29.00	816.50		372.30	25.27	389.12	50.20	2,109			35.62		*169.87	1,532.34	2,080.21	Nov. 20, 1915	Asphalt block	1890		P. Maloney.
thwest	do.	228.32	3,237.63	254.12	3,890.72	55.00	46.00	25.00	70.60	1,850.13	82.35	265.34	11,450			50.24	330.37		6,361.63	6,692.00	July 21, 1915	Asphalt	1879		W. C. Murdock.
do.	do.	1,941.29	508.68	29.00	698.57	39.00	13.50	329.20	410.00	1,225.88	50.24	189.52	7,850			53.38			4,851.80	5,189.36	July 7, 1915	do.	1891		Barber Asphalt Paving Co.
do.	do.		696.97	18.24	864.50		5.36		146.75	80.30	161.13	59.64	2,500			18.84	184.01	71.94	960.71	1,216.66	Aug. 25, 1915	do.	1885		Do.
do.	do.	147.51	4,608.18	42.57	6,768.08	45.00	145.00	5.27	56.00	1,522.57	75.55	460.67	19,350			61.67	512.66		7,239.19	7,751.85	Apr. 28, 1915	do.	1884		Do.
do.	do.	1,690.95	67.90	14.01	101.85		36.07	708.00		527.24	6.30	98.15	4,105			6.28	99.05		5,310.53	5,409.58	Aug. 11, 1915	Coal tar	1873	1890	Evans Concrete Co.
do.	do.	819.28	123.65	.61	174.80	137.50	71.20	113.50	357.59	92.55	357.65	49.15	2,100			37.68	334.38	*135.57	2,308.66	2,778.61	Aug. 16, 1915	do.	1872	1879	John O. Evans.
do.	do.	4,631.11	51.59	12.90	71.90	135.00	133.80	975.72	898.83	644.58	873.25	354.84	14,700			9.42	1,027.37	398.55	11,184.30	12,610.42	July 6, 1915	Vulcanite coal tar	1875	1890	J. W. Vandenberg.
do.	do.	741.84	116.06	7.06	71.85	40.00	45.50	145.50	54.00	668.12	37.76	102.75	4,430			61.82	163.26		2,012.56	2,175.82	Aug. 26, 1915	Bituminous base	1890		Cranford Paving Co.
		28,883.73	38,977.96	2,221.45	55,848.06	1,440.52	2,782.31	5,942.30	8,762.48	15,902.21	8,221.96	3,986.10	180,700	7,712.15		10.25	10,968.17	3,559.85	135,194.09	149,722.11					

* Chargeable to sidewalks and curbs.
 † Chargeable to sidewalks and curbs.

‡ Square yards, asphalt block.
 § \$2.06 chargeable to sidewalks and curbs.

¶ \$5,700 chargeable to 1915 appropriation.
 * \$67.84 chargeable to sidewalks and curbs.

Work done by municipal plant (minor repairs, 1916):

95,628 cubic feet old material, at 36 cents..... \$34,426.08
 2,275 cubic feet topping, at 42 cents..... 955.50
 17,145 cubic feet asphaltic concrete, at 38 cents..... 6,600.83

Total..... 41,982.41



TABLE H.—*Appropriation for repairs to streets, avenues, and alleys.*

WORK DONE BY DAY LABOR UNDER SUPERVISION OF SUPERINTENDENT OF STREETS.

Brick sidewalk relaid	square yards	30,298.00
Asphalt block paved	do.	1,369.50
Asphalt block repaved	do.	15,017.50
Vitrified block paved	do.	1,886.50
Vitrified block repaved	do.	6,638.50
Macadam roadway	do.	9,186.00
Curb reset	linear feet	4,229.42
Flag relaid	do.	719.00
Granite block laid	square yards	11,002.00
Asphalt tile relaid	do.	363.00
Cement walk relaid	do.	1,815.00
Cobble relaid	do.	5,024.00
Grading	cubic yards	4,531.00
Labor		\$65,605.86
Material		8,689.77
Total		74,295.63

RECAPITULATION.

Northwest section east of Sixteenth Street	\$19,176.62
Northwest section west of Sixteenth Street	11,272.92
Northeast section	13,959.76
Southeast section	10,346.96
Southwest section	14,974.48
Georgetown section	4,564.89
	74,295.63

WORK DONE BY DAY LABOR UNDER SUPERVISION OF SUPERINTENDENT OF SUB-URBAN ROADS.

Job No.	Location.	Work.	Cost.
1007	Corner Euclid Street and University Place	Repair intersection	\$63.75
1021	Various streets	Tarvia	2,940.96
1029	V Street, NW., between North Capitol and First Streets	Repair	467.61
1035	North side of V Street NE., between North Capitol and Lincoln Road	Grade and gutters	261.87
1039	Kenyon Street NW., between Eighteenth and Nineteenth Streets	Repairs	190.59
1044	South side of V Street NW., between North Capitol and First Streets	Curb and gutters	326.50
1045	North side Nineteenth Street NW., between Lamont and Kilbourn Streets	Gutters	238.59
1054	Bryant Street NW., between Second and Fourth Streets	Repairs	667.45
1055	West side Brown Street NW., between Newton and Oak Street	Gutters	311.75
1056	Brown Street NW., Newton to Oak Streets	Repairs	521.42
1058	Irving Street NW., between Fourteenth and Sixteenth Streets	Tarvia	585.28
1070	Various streets (stone from Sherman Avenue)	Repair	342.81
1079	West approach to T Street bridge	do.	65.50
1084	Adams Mill Road NW., between Harvard and Irving Streets	do.	788.58
1085	Tracy Place NW., from Twenty-third Street, westward	do.	271.00
1091	Second Street NW., from U to Bryant Streets	do.	41.29
1114	Fifteenth Street NW., between Euclid Street and Florida Avenue	do.	181.46
1134	Florida Avenue NW., north of U Street	do.	55.60
1011	Park Place NW., between Kenyon and Irving Streets	do.	125.50
1050	Monroe Street NW., between Fourteenth and Seventeenth Streets	Patching	110.53
1095	Hobart Street NW.	Repair	91.50
1102	Champlain Street NW., from Florida Avenue, northward	do.	67.50
1164	North side Irving Street NW., east of Eighteenth Street	Relay gutters	59.21
1179	Quebec Street NW., between Georgia Avenue and Park Place	Repair	32.26
1175	Prospect Street NE., Lincoln Road to Second Street	do.	84.90
1017	Lincoln Road, between R and V Streets	do.	62.75
1018	T Street NE., Lincoln Road to Second Street	do.	64.75
1049	Newton Street NW., between Fourteenth and Seventeenth Streets	Macadam	118.46
1097	Roadway of Connecticut Avenue bridge	Repair	160.85
1096	Euclid Street NW., between Sixteenth and Eighteenth Streets	do.	224.41
1100	Lanier Place NW., Ontario Place to Adams Mill Road	do.	180.21
1101	Lamont Street NW., between Fifteenth to Mt. Pleasant Streets	do.	80.06
1103	Kalorama Road NW., between Champlain and Sixteenth Streets	do.	133.25
1176	Seaton Street NE., between Lincoln Road and Second Street	do.	33.95
1196	New Hampshire Avenue NW., between Monroe and Georgia Avenue	Crushed stone	714.33

WORK DONE BY DAY LABOR UNDER SUPERVISION OF SUPERINTENDENT OF SUB-URBAN ROADS—Continued.

Job No.	Location.	Work.	Cost.
1207	Park Road NW., between Seventeenth and Twentieth Streets.	Repair.....	\$719.40
1209	North Capitol Street, between V and Michigan Avenue.....	do.....	824.11
1235	Euclid Street NW., between Columbia Road and University Place.	do.....	87.85
1182	Wyoming Avenue NW., west of Twentieth Street.....	Old material.....	291.50
1195	Lamont Street NW., between Sixth and Warder Streets.....	Repair.....	91.25
1202	Various streets, Section 2.....	Tarvia.....	2,430.47
1201	Various streets, Section 3.....	do.....	603.68
1203	Various streets, Section 2.....	Oil.....	72.31
1212	Belmont Street NW., 100 feet west of Twentieth Street.....	Pave gutters.....	50.50
1234	Monroe Street NW., between New Hampshire Avenue and Fourteenth Street.	Repair.....	43.67
1187	Sixteenth Street NW., between Columbia Road and Oak Street.	do.....	2,111.19
1214	Massachusetts Avenue NW., from end of asphalt to east end of bridge across Rock Creek.	Resurface.....	516.27
	Dangerous holes and minor repairs.....		18,506.61
			6,589.04
	Blacksmithing.....		25,095.65
			164.60
	Total.....		25,260.25

TABLE I.—*Regular permit, 1916.*

[illegible]

TABLE I.—Regular permit, 1916—Continued.

Job No.	Location.	For whom done.	Grading. Cu. yds.	Cement sidewalk laid. Sq. yds.	Curb reset. Lin. ft.	Curb set.		Vitrified block paved. Sq. yds.	Asphalt block paved. Sq. yds.	Brick sidewalk. Sq. yds.	Old stone curb.	Cost.
						6 by 20 inches.	8 by 8 inches.					
2030	East side Colorado Avenue NW., between Madison and Montague Streets.	B. H. Gruver.....		40.83								\$50.30
2031	Front, 1010 N Street NW.	L. N. Record.....		20.38								25.11
2032	M Street side of 1150 Eleventh Street NW.	Charles T. Burns.....		130.30								131.00
2033	1320 Kenyon Street NW.	Charles W. Summers.....		3.50								3.70
2034	2124 Fourteenth Street, SE.	Leo A. M. Readmond.....		67.47								83.12
2035	Georgia Avenue NW., between Flagler and Shepherd Streets.	Edgar L. Thomas.....		33.33								41.06
2037	1433 Chapin Street NW.	Katharine Reinburg.....		10.66								11.50
2038	1439 Chapin Street NW.	J. O. Lewis.....		13.22								13.38
2039	South side Kenyon Street NW., between Eleventh Street and Adams Mill Road.	Geo. Y. Worthington & Son.....	5	40.40			62.00					130.55
2040	404-408 South Carolina Avenue SE.	Julius Wehnig.....		67.61								83.20
2042	Thirteenth and Lowell Streets, lots 13 and 14, square 2889.	C. A. N. Miller.....		184.67								227.51
2043	Southwest corner Sixteenth and Madison Streets NW.	William Ramsay.....		69.40			82.52					193.00
2044	West side Sixteenth Street NW., between Madison and Montague Streets.	do.....		85.00			85.00					223.30
2045	North side Tracy Place NW., from Twenty-third Street west.	R. H. Liggett.....					130.00					176.37
2046	North side Columbia Road, between Fourteenth and Fifteenth Streets.	Fred. A. Schmitt.....		64.52								79.50
2047	East side Twenty-third Street, between Wyoming Avenue and California Street.	G. G. Cornwell.....		35.02								43.14
2048	South side Meridian Street NW., between Sixteenth and Center Streets.	N. B. Mullett & Co.....		62.87	7.10		111.10					221.18
2049	North side Kenyon Street NW., between Nineteenth Street and Adams Mill Road.	Geo. Y. Worthington & Son.....	127	200.90			393.90					905.17
2052	1312 N Street NW.	Lewis C. Putnam.....		3.50								3.48
2053	South side Kenyon Street NW., from Adams Mill Road to alley.	Kennedy Bros. (Inc.).....	40	111.25	15.21		149.90					358.17
2056	East, north, and south alley, square 928.	D. J. Dunigan.....						401				385.00
2062	Front, 1346 Irving Street NW.	Chapman W. Fowler.....	250	6.00								5.18
2068	Front, 2119 S Street NW.	Charles C. Wagner.....		17.00								18.13

2001	West side Twenty-fifth Street NE., between Hamlin Street and Grand Place, and south side Hamlin Street, between Twenty-fourth and Twenty-fifth Streets.	J. Minke.....	135.40					171.28
2004	West side Twenty-fifth NE., between Hamlin and Grand Streets.	Henry A. Vieth.....	40.00					50.60
2013	1000 Quincy Street NE.....	Franklin T. Howe.....	98.67					124.82
2021	West side Central Avenue, between Myrtle Avenue and Brentwood Road.	James A. McCarthy.....	26.53					33.56
2041	South side Upshur Street NW., between Illinois Avenue and Fifth Street, Northwest corner New Hampshire Avenue and V Street NW.	A. C. Moses Construction Co. J. J. Dimon.....	193.63 51	7.60	19.60			289.13
2050	South side Wyoming Avenue NW., between Twenty-third and Twenty-fourth Streets.	D. J. Callahan.....	209.56		47.34			249.84
2054	Allison Street NW., between Georgia and Iowa Avenues.	J. B. Gruver.....	55.56					150.66
2055	North side Kearney Street NW., between Fifteenth and Sixteenth Streets.	H. B. Callahan.....	149.53					209.72
2057	Fifth Street NW., between Taylor and Upshur Streets.	M. L. Gottwals.....	133.47					168.84
2058	2003, 2005, 2007 Belmont Road and 2400 Twentieth Street.	R. P. Hill.....	98.19					124.21
2059	2702 Wisconsin Avenue.....	George A. Craig.....	150.98					199.46
2060	South side Wyoming Avenue NW., between Twenty-third and Twenty-fourth Streets.	Mary C. de Graffenreid.....	42.98 60.69	12.80	53.25			60.04 168.50
2063	East side Fifth Street NW., between Shepherd and Taylor Streets.	D. J. Dunigan.....	234.22					296.28
2065	Park Place NW., between Rock Creek Church Road and Quebec Street.	Kennedy Bros. (Inc.).....	205.67					265.12
2066	West side Twenty-fifth Street NE., between Hamlin Street and Grand Place.	O. I. Nigh.....	67.00					84.75
2067	1227, 1229, 1231 Jackson Street NE.....	John R. Haislip.....	66.80					84.50
2078	Alley, square 3238.....	D. J. Dunigan.....	175		633			1,235.30
2081	Woodley Place, north of Calvert Street, Southeast corner Seventh and Shepherd Streets.	W. F. Ham.....	79.59					124.01
2083	Fourteen-and-a-half Street NE., between C and D Streets.	Oscar Schielehoff.....	20.00					100.08
2088	Kenyon Street side southwest corner Eighteenth and Kenyon Streets.	K. L. Russell.....	100.04		160.20			120.16
2103	West side Eighteenth Street NW., between Irving and Kenyon Streets.	Geo. Y. Worthington & Son.....	78.85					346.87
2106	1617 Twenty-ninth Street NW.....	Charles L. Tarterley.....	69.40	18.30				194.00
2107	2304-2312 Union Street NW.....	George A. Fuller Co.....	34.00					192.96
2108	East side Sherman Avenue, between Fairmont and Grand Streets.	John M. Henderson.....	33.00					142.99
2109		D. J. Dunigan.....						142.00

† 1915 book.

TABLE I.—Regular permit, 1916—Continued.

Job No.	Location.	For whom done.	Grading. <i>Cu. yds.</i>	Cement sidewalk laid. <i>Sq. yds.</i>	Curb reset. <i>Ltn. ft.</i>	Curb set.		Vitrified block paved. <i>Sq. yds.</i>	Asphalt block paved. <i>Sq. yds.</i>	Brick sidewalk. <i>Sq. yds.</i>	Old stone curb.	Cost.
						6 by 20 inches.	8 by 8 inches.					
2111	North side Girard Street, east of North Capitol Street.	Thomas A. Jameson.....	.....	99.93	.....	.....	.....	.....	.....	.....	.....	1 121.72
2113	West side Nineteenth Street NW., between Kilbourne Place and Lamont Street.	Simon Oppenheimer.....	.....	55.40	.....	.....	.....	.....	.....	.....	.....	1 68.00
2114	Southwest corner Second and C Streets	Albert and Charles A. Curry trustees.....	.....	73.47	.....	.....	.....	.....	.....	.....	.....	1 89.49
2115	17th Pennsylvania Avenue NW.	Julius Weing.....	.....	84.52	.....	.....	.....	.....	.....	.....	.....	1 102.94
2117	203 Lincoln Place SW.	W. Walton Edwards.....	.....	29.39	29.75	.....	.....	.....	.....	.....	.....	1 42.57
2118	East side Sherman Avenue and south side Girard Street NW.	Harris Shapiro.....	.....	90.64	.....	.....	.....	.....	.....	.....	.....	1 117.30
2119	Southwest corner Fourteenth and Franklin Street NE.	Thrift Building Co.....	.....	219.03	.....	.....	.....	.....	.....	.....	.....	1 279.48
2120	East side Thirteenth Street NW., between Emerson and Farragut Streets.	Horace C. Smithy.....	.....	232.16	.....	.....	.....	.....	.....	.....	.....	1 296.24
2121	West side Central Avenue, between Myrtle Avenue and Brentwood Road.	Henry A. Vieth.....	123	136.53	.....	.....	.....	.....	.....	.....	.....	1 249.56
2122	West side Nineteenth Street NW., between Kenyon Street and Kilbourne Place.	Geo. Y. Worthington & Son.	.....	141.07	.....	.....	218.56	.....	.....	.....	.....	1 458.98
			1,278	6,571.32	194.59	289.30	2,032.22	1,376	.....	.....	.....	1 14,178.93

1 1915 book.

TABLE K.—*Assessment work, 1916.*

[illegible]

[illegible]

Not completed.

TABLE K.—Assessment work, 1916—Continued.

Job No.	Location.	Grading. Cu. yds.	Cement sidewalk. Sq. yds.	Curb reset. Lin. ft.	Curb set—			Vitrified block paved. Sq. yds.	Asphalt block paved. Sq. yds.	Cobble paved. Sq. yds.	Granite block. Sq. yds.	Cement road-way. Sq. yds.	Cost.
					6 by 20 inches.	8 by 8 inches.	Old.						
3140	East side of Wisconsin Avenue NW. from Newark to Idaho Avenue, and Idaho Avenue from Wisconsin Avenue to Ordway Street.	283	390.93										\$654.49
3141	North side of Potomac Avenue SE. from Eighth to Ninth Street and west side of Ninth Street from Potomac Avenue to L Street.		539.63	63									559.59
3142	South side of Potomac Avenue SE. from Ninth to Tenth Street.		377.98	258.65									428.49
3143	South side of Potomac Avenue SE. from Eleventh to Twelfth Street, and Eleventh Street and Potomac Avenue to L Street.		281.21										284.59
3144	South side of Potomac Avenue SE. from Reservation 253 to Thirtieth Street.		163.93										165.89
3145	South side of A Street SE. from Seventh to Eighth Street.		259.19	14			72.80						282.46
3146	West side of Fourteenth Street SE. from South Carolina Avenue to cement walk.		78.79										98.72
3147	North side of B Street SE. from Eighth to Ninth Street.		230.87	53			11.60						256.32
3150	Alleys, Square 2900.							136					322.58
3154	Alley, southwest part of Square 502.	175	627.65					310					636.58
3159	East side of Seventh Street NW. from P to Q Street.		307.42	85									639.03
3160	South side of L Street SE. from Tenth to Eleventh Street.												332.34
3161	West side of L Street SE. from D to Duncan Street, west side of Fifteenth Street NE. from E to F Street, west side of Fifteenth Street NE. from F to F Street, west side of Fifteenth Street.	475	455.29	10	9.42			411					463.50
3168	East half of Square 3045, alley.												1,273.23
3170	North side of California Street NW. from west line of lot 802, Square 2505.		339.07										445.68
3173	Both sides of Tenth Street NW. from little B Street to Pennsylvania Avenue.		1,249.62										1,295.95
3175	East side of Sixth Street NW. from Missouri Avenue to alley, north.					156.38							215.05
3188	East side of Eighteenth Street NW. from Pennsylvania Avenue to H Street.												199.71
3041	Alley, Square 980.				75.36			1,427					3,452.25
3132	Alley, Square 3024.	675	5.50		18.84			1,161					2,279.41
3165	Alley, Square 118.	50						250					536.10
3178	Alley, Square 2540.				17.27			156					502.13
3180	Alley, Square 899.	106						124					327.12
3083	Alley, Square 3046.	562			18.84			980					2,402.72
3085	Alleys, Square 3228.	718			56.52			942					2,095.13

3171	Fourteenth Street NW, from Monroe Street to Meridian Place (west side)	106	11	678.05	124	35	235	851.36
3180	Alley, Square 809.	60			405			327.12
3181	Alley, Square 1071.	706			823			898.37
3002	Alley, Square 3585.	200			1,288			1,890.27
3184	Alley, Square 2894.	649		37.68		480		2,502.09
3185	Alley, Square 3573.	50			234			1,626.44
3166	Alley, Square 2895.	1,220		18.84		1,534	22	3,684.08
3167	Alley, Square 2907.	730		28.26		1,762		4,015.59
3169	Alley, Square 2904.				486			1,286.46
3177	Alley, Square 5990.	120				177		522.95
3179	Alley, Square 2235.	1,350	16			1,418		3,783.46
3182	Alley, Square 2850.				959			1,937.75
3187	Alley, Square 762.			18.84	610			1,476.34
3191	Alley, Square 3229.	370						1,324.75
3004	Northwest section, east of Sixteenth Street.							1,257.78
3006	Northwest section, east of Sixteenth Street.							1,520.03
3039	Alley, Square 3563.							2,145.51
3044	Various sections.							2,234.56
3233	Alley, square 2720.	600.00					1,888	1,272.71
3237	Alley, square 3240.	300.00						3,984.49
3239	Alley, square 2688.				547			3,987.67
3240	Alley, square 1077.				210			3,548.12
3244	Alley, square 2720 west.							3,788.00
3245	Alley, square 617.							3,197.00
3246	Alley, square 293.							444.55
3311	Alley, square 234.							280.10
3073	East side Fifteenth Street NW., between Euclid and Harvard Streets.		423.59					284.62
3092	South side Girard Street NE., between Mills Avenue and Twenty-fifth Street.	6.00	225.67					713.99
3093	Both sides Lawrence Street NE., east from Twentieth Street.		204.67					2,890.37
3094	Past side Seventh Street NE., between H and K Streets.		680.10					
3095	Both sides I Street NE., from Eighth to Eleventh Streets.		2,020.77					
3113	West side Connecticut Avenue NW., from H to I Streets, and north side of I Street from Connecticut Avenue to Seventeenth Street.		47.14	1,739.60				596.76
3114	South side Monroe Street NE., between Fifteenth and Sixteenth Streets.	36.00	569.49					411.31
	West side Twenty-sixth Street NE., from South Dakota Avenue to Irving Street.		307.93					
3119	South side Irving Street NE., from Twenty-sixth Street to South Dakota Avenue.		1,294.30					1,637.29
	North side South Dakota Avenue, from Irving to Vista Streets, and east side of South Dakota Avenue from Carlton to Vista Streets.							
3162	West side Twentieth Street NE., from Lawrence to Jackson Streets.	21.00	405.73					374.15
3163	South side Lawrence Street NE., from Eighteenth to Twentieth Streets.	294.27						372.25
				</				

¹ Repairs.² Repair behind cement walks.³ Not completed.

3346	Alley, square 991.	35.00	18.84	37.68	18.84	1,023	325	33	1104.12
3353	Alley, square 3241.	35.00				1,023			165.75
3354	Alley, square 2715.	200.00				1,109			715.23
3360	Alley, square 3236.	440.00	32.97			685			2,818.56
3362	Alley, square 1011.	675.00				70			2,385.72
3345	Alley, square 1011.	9.00							1,656.64
3000	Various streets—adjusting plumbing.								150.70
3007	Southeast section.								363.96
3008	Georgetown section.								222.75
3009	Northwest section west of Sixteenth Street.								21.81
3030	West side Connecticut Avenue NW., from Macomb to Newark Streets.								269.19
3051	South side Perry Street NE., from Twelfth to Thirteenth Streets.	218.74							232.64
3052	North side V Street, from North Capitol Street westward.	305.40							352.30
3055	West side Bladensburg Road, north of entrance to Mount Olivet Cemetery.	450.00	238.80						367.24
3057	North side Everts Street NE., from Twentieth to Twenty-second Streets.	242.00							1,327.89
3060	Both sides Fourth Street NW., from Butternut to Cedar Streets.								3420.85
3063	West side Flagler Place NW., from V to W Streets.	425.50	17.00						3567.89
3082	West side Eighth Street NW., from New Hampshire Avenue to Shepherd Street.	247.50	37.00						279.02
3148	East side Lanier Place, from present walk on Quarry Road to Harvard Street.	440.95							3562.65
3154	North side M Street NW., from New Jersey Avenue to New York Avenue, and on New York Avenue from M to First Streets.	227.38							3293.43
3170	West side Eighth Street NE., between Lawrence and Monroe Streets.	911.81	58.00						3944.65
3179	South side Elm Street NW., from Thrd to Fourth Streets.	212.26							3282.63
3181	West side Fifth Street NW., from U to W Streets.	237.98	9.42						3254.46
3183	North side Irving Street NE., from Fourteenth to Sixteenth Streets.	867.57	600.00						31,222.76
3185	South side of H Street NW., between North Capitol and First Streets.	576.29							3701.91
3188	East side Second Street NW., from Adams Street south to school site.	424.70							3448.48
3189	West side Maple Avenue, from Carrol Avenue to District line.	577.03							3610.99
3193	West side Lanier Place NW., Quarry Road to Harvey Street.	61.34							378.26
3194	North side Lanier Place NW., from end of present walk to Quarry Road.	280.42							3357.83
3195	East side Eighteenth Street NW., from Summit Place to Quarry Road.	80.64							3102.89
3196	East side Nineteenth Street NW., from Quarry Road to Harvard Street.	213.47	47.00						3293.64
		125.53							3165.12

1915 book

Repairs.

Not completed.

TABLE I.—Sidewalks and curb, 1916.

Job No.	Location.	Cement sidewalk laid.	Curb reset.	Curb set.		Grading.	Brick sidewalk relaid.	Asphalt block relaid.	Vitrified block laid.	Cost.
				6 by 20 inches.	8 by 8 inches.					
		Sq. yds.	Lin. ft.			Cu. yds.	Sq. yds.	Sq. yds.	Sq. yds.	
2506	West side Fifteenth Street NW., between Pennsylvania Avenue and E Street.	363.45	48.00		145.07					\$378.85
2507	Eighteenth Street side Reservation 31.									181.26
2508	Twenty-seventh Street NW., between I and K Streets.									158.85
2511	Thirty-fourth and Lower M Street sides of Eaton School.	495.84		132.32	9.42					908.41
2510	Around Reservation 8.				337.02					639.42
2512	South side of C Street SE., between Fourteenth and Fifteenth Streets.	208.05	171.00							237.70
2513	South side of D Street SE., between Third and D Streets SE.	115.02								110.77
2514	South side Potomac Avenue SE. from Twelfth to Thirteenth Streets.	319.45	20.00							311.51
2515	Pennsylvania Avenue SE. from Second to Eighth Streets.		74.88		727.55					935.19
2516	Fourth Street SE. from Pennsylvania Avenue to North Carolina Avenue.				187.09					230.19
2517	Around Reservations 71 and 176.	506.88								451.53
2518	East side Seventh Street NW., between O and P Streets (school).	636.07								613.37
2519	Nichols Avenue SE., adjoining police station.	71.54								83.24
2522	West side Tenth Street, between B and Little B Streets.	364.27								350.35
2525	North, south, and west sides Farmers' Market.	1,839.14		1,208.40						2,063.38
2526	North side W Street SE., between Thirteenth and Fourteenth Streets (school).	173.62	5.00							202.41
2527	West side Congress Road, between Alabama and Nichols Avenues.	227.87								202.05
2528	Reservation B Street SE., between Eighth and Ninth Streets.	82.17								78.06
2529	Reservatoin B Street SE., between Sixth and Fifteenth Streets.	55.50								4.52
2530	Maryland Avenue N.E., between Sixth and Fifteenth Street.	3.33								525.67
2531	Southeast corner Minnesota Avenue and Fifteenth Street.									1,644.50
2531	H Street NW., between North Capitol and First Streets.			431.17						1,356.00
2501	Northwest section east of Sixteenth Street.									1,694
2501	Northwest section.									1,407.75
2502	Northwest section west of Sixteenth Street.									
2504	Armstrong School Building, Twenty-seventh Street NW., between I and K Streets.	191.38								2,183.72
2519	North side of M Street sides of Reservation 181.	635.70	345.43							2,690.51
2530	Hamilton School, Bladensburg Road.	42.20								2,48.95
2531	Fillmore School, Thirty-fifth Street, between R and S Streets.	363.04								2,355.20
2535	Colored High School, M Street between New Jersey Avenue and First Street.	191.09			178.60					2,399.79
2537	Maryland Avenue N.E., from Sixth to Fifteenth Streets.	120.33								2,139.58
2538	East side Sixteenth Street NW., between Kennedy Street and Colorado Avenue.	52.60								2,61.02
		7,063.14	664.31	1,346.72	2,017.72					11,805.03

* 1915 book.

1 Repairs.

TABLE M. — Miscellaneous work, 1916.

Job No.	Location.	Appropriation.	Grad- ing.	Brick side- walk relaid.	Curb reset.	Curb set.			Cement walk.	Vitrif- ied block relaid.	Asphalt block relaid.	Granite block relaid.	Description.	Cost.
						6 by 20 inches.	8 by 8 inches.	Lin. ft.						
1507	Hanover Street NW, from North Capitol Street westward.	Southwest section.	Cu. yds.	Sq. yds.	Lin. ft.				Sq. yds.	Sq. yds.	Sq. yds.	Sq. yds.	Adjusting plumbing.	\$22.25
1601	N Street Bridge over James Creek Canal.	do.											Removing abutments.	848.25
1604	M Streets.	do.												343.46
1606	N Street SW, Third Street to South Capitol Street.	do.	400	700							70	52		623.29
1705	Twelfth Street SE, between B and Pennsylvania Avenue.	do.	800	600							300			199.25
1804	Tennessee Avenue NE, between B and D Streets.	do.												11.37
1806	A Street NE, between North Carolina Avenue and Fifteenth and Fourteenth Streets between North Capitol Street and North Carolina Avenue.	do.												73.74
5101	Division Avenue NE, to Grant Street toward District of Columbia line.	Roadway northeast. Division Avenue to Grant Street.												3,114.61
5141	Sherman Avenue NW, between Columbia Road and Park Road.	Grade and improve Sherman Avenue NW.											Subgrade, sewer and rolling.	124.69
5142	do.	do.											Clean and pile granite block.	1,102.37
5151	Grade and improve V Street NE, Lincoln Road to Second Street.	Grade and improve V Street NE, Lincoln Road to Second Street.											Removing stone and cobble gutters.	170.20
5152	do.	do.											Oiling.	5.25
5161	W Street NW, from North Capitol Street to Flagler Place.	Pave W Street NW, North Capitol Street to Flagler Place.											Adjusting macadam at end of pavement.	189.70
5162	do.	do.											Repairing intersection.	5.25
6000	Benning's Viaduct Bridge.	Benning's Viaduct Bridge.											Adjusting macadam at end of pavement.	16.25
6003	Adjacent to District pumping station.	Water Department, District of Columbia high service.				225			28		210	36	Digging test pits.	680.62

TABLE M.—Miscellaneous work, 1916—Continued.

Job No.	Location.	Appropriation.	Grad- ing.	Brick side- walk re-laid.	Curb reset. <i>Lin. ft.</i>	Curb set.		Cement work.	Vitrif- ied block re-laid.	Asphalt block re-laid.	Granite block re-laid.	Description.	Cost.
						6 by 20 inches.	8 by 8 inches.						
6004	Bryant Street west of Second Street.	Water Department Dis- trict of Columbia.											\$99.21
6018	North and south 10-foot alley, Square 724.	Elimination of grade crossings.	2	12			9.42	Sq. yds., 20	Sq. yds., 15				16.65
1508	Hanover Street NW, from North Capitol Street west- ward.	Northwest section.						6				Apply Ugitte.	73.67
1608	I Street SW., from Seventh to Ninth Street.	Southwest section.		180							160		152.12
1609	Union Street SW., from O to M Streets.	do.										Apply Ugitte	297.90
1708	Thirteenth Street SE, from B to South Carolina Avenue.	Southeast section.	25	75						44	10		117.00
5003	Albemarle Street NW., Con- nect Avenue to Reno Road.	Grade Albemarle Street.										Preparing subgrade and cinders on side- walk.	708.32
5031	Division Avenue NE, Wash- ington Court to Deane Avenue.	Grade Division Avenue NE.										Grading.	406.38
5051	Keaton Street NW, Georgia Avenue to Park Place.	Grade and improve Keat- on Street NW.										Ugitte and miscel- laneous work.	384.48
5061	Monroe Street NE, Twelfth to Thirteenth Streets.	Grade and improve Mon- roe Street NE.										Preparing subgrade and placing stone.	1,424.19
5071	Myrtle Street NE, Dakota to Central Avenues.	Grade and improve Myr- tle Street NE.										do.	801.38
5091	Pennsylvania Avenue S.E., Branch Avenue to Bowen Road.	Widen Pennsylvania Ave- nue SE.										Grade and gravel (not completed).	326.87
5131	Sheriff Road NE., end of ma- cadam to District of Columbia line.	Grade and improve Sher- iff Road NE.										Grade, spread, and roll macadam.	3,675.44
5103	W Street NW., North Capitol to Flager Place.	Pave W Street NW.										Apply Ugitte	238.48
6006	Various streets.	Parking Commission										Paving tree spaces.	978.17
6012	do.	Police Department										Marking reservations.	267.55
6022	Q Street Bridge.	Construction of Q Street bridge.										Construct revetment wall on south side.	1,199.91
6026	South approach to Anacostia Bridge.	Maintenance of Anacos- tia Bridge.										Rebuilding fence.	767.68

6429	Pennsylvania Avenue Bridge across Rock Creek.	Pennsylvania Avenue Bridge across Rock Creek.								Grading and providing ladder for access to vault.	280.77
6033	Anacostia Bridge.	Maintenance of Anacostia Bridge.								Replace bumper blocks.	52.95
5121	Seventh Street SE., Alabama to Nichols Avenues.	Grade and improve Seventh Street SE.								Grade and gravel.	1,003.76
6036	Q Street Bridge approaches.	Construction of Q Street Bridge.								Tarvia and stone.	687.22
			1,227	2,167	244.42	54			739		13,844.24

TABLE N.—*Whole cost work, 1916.*

Job No.	Location.	For whom done.	Grading.	Cement side-walks laid.	Brick side-walks relaid.	Curb reset.	Curb set 6 by 20 inches.	Vitrified block drive-way.	Cement gutter laid.	Curb set 12 by 14 special.	Description.	Cost.
			<i>Cu. yds.</i>	<i>Sq. yds.</i>	<i>Sq. yds.</i>	<i>Lin. ft.</i>			<i>Lin. ft.</i>			
6000	East side Fourth Street NE. from Michigan Avenue south.	Rev. Robert A. Skinner									Cinder path.	\$75.00
6008	South gate of premises 5756 Georgia Avenue.	Ed. McCleary									Repairing entrance to driveway.	13.00
6009	Parking Sixty-third Street and Eastern Avenue.	J. S. Tyree									Cinders.	25.91
6011	L Street NW. between Vermont Avenue and Fifteenth Street.	W. F. Breniger Co.	125		225							42.61
6015	Twenty-seventh Street NW. between Dumbarton and P Streets.	Warner, Quinlan Co.									Hauling macadam.	10.00
6023	East side Baltimore Road NW. front lot 2, Square 1769.	William Offutt.	9								9½ granite block roadway.	10.00
6027	Alley, square 99, between Twentieth and Twenty-first, M and N Streets NW.	Thomas B. Ferguson.									Paving space adjacent to garage.	5.25
6035	Alley, rear 1734 Lamont Street NW.	George W. Linkens									Repair.	16.55
6044	Driveway, Eighth Street, NW. between Florida Avenue, Barry Place.	John Battiste						10				10.80
6024	West side Thirty-second Street NW. from R Street north 215 feet.	Charles G. Warden.		107.89		19.00						141.70
6028	P Street side of premises northwest corner Seventh and P Streets NW.	William McGuire.									Paving parking space with brick.	13.80
			134	107.89	225	19.00		10				364.62

TABLE O.—*Number of square yards and cost of repairs to cuts in streets, avenues, and alleys during the fiscal year ended June 30, 1916.*

Item No. 1 shows the number of square yards and cost of repairs to cuts made by various plumbers and corporations at flat rates.

Item No. 2 shows the number of square yards and the cost thereof on "whole cost" work to which 5 per cent is added for tools, clerk hire, etc., for the maintenance of the miscellaneous trust-fund deposits (District of Columbia), operating account, streets, which fund is used to pay all accounts for labor material, tools, etc., used in connection with this class of work.

Item No. 3 shows the number of square yards and cost of work done on account of the Sewer Department.

Item No. 4 shows the number of square yards and cost of work done on account of the Water Department.

Item No. 5 shows the number of square yards and cost of work done on account of other appropriations of the District of Columbia; the cost of work charged against retents, also various appropriations of the General Government.

	Square yards.	Cost amount charged.
Item No. 1 (plumbers and corporations cuts at flat rate):		
Sheet asphalt.....	1,134.00	\$3,685.50
Granite block.....	508.40	762.62
Asphalt block.....	1,026.81	1,540.24
Vitrified block and brick.....	420.00	1,050.05
Cobble and rubble.....	520.53	312.32
Macadam.....	708.93	850.72
Cement sidewalks.....	16,167.74	26,831.26
Brick sidewalks.....	200.00	540.20
Bricks furnished.....	4,500.00	45.00
Asphalt blocks furnished.....	2,694.00	202.07
Vitrified blocks furnished.....	1,050.00	210.00
Plumbing in macadam roadways repaired at actual cost plus 5 per cent.....	(1)	196.56
	20,686.41	36,226.54
Item No. 2: Various corporations and individual depositors.....	35,721.81	51,008.47
Item No. 3: Various appropriations of the Sewer Department.....	3,576.20	9,774.53
Item No. 4: Various appropriations of the Water Department.....	7,298.55	14,234.63
Item No. 5: Various appropriations other than the above, including repairs to roads, streets, electrical department, improvements and repairs, assessments and permit work, parking commission, etc.....	3,441.68	13,405.58
	70,724.65	124,649.75

¹ Included in macadam cuts.

Total number of charges made for repairing cuts of all kinds, 10,151.

TABLE P.—*Grading streets, alleys, and roads, appropriation, 1916.*

Job No.	Location.	Grading.	Cost.
		<i>Cubic yds.</i>	
1901	South side Franklin Street NE., from Twentieth to Twenty-fourth Streets, and west side Twenty-second Street NE., south of Franklin Street.....	427	\$353.99
1903	Eastern Avenue NE., Field Place, and Fifty-eighth Street.....	150	77.25
1904	Twenty-eighth Street NW., north of Woodley Road.....	4,500	913.87
1913	Alley, square 1746.....	160	110.00
1914	Sixth Street NW., between Aspen and Butternut Streets.....	2,700	1,003.81
1915	Fourth Street NW., between Butternut and Cedar Streets.....	500	342.50
1916	South Dakota Avenue NE., between Carlton and Vista Streets.....	2,000	610.25
1918	Park Place NW., between Irving and Rock Creek Church Road.....	325	223.50
1920	Que Street SE., east of Twenty-fifth Street.....	350	146.06
1921	Alley, Oakwood Terrace.....	78	65.50
1922	Montana Avenue NE., between Twelfth Street and Brentwood Road.....	2,700	809.68
1923	Thirty-eighth Street NW., north of Massachusetts Avenue.....	190	73.63
1924	Newton Street NW., west of Georgia Avenue.....	600	311.75
1925	Perry Street NE., between Twelfth and Thirteenth Streets.....	2,000	713.74
1926	Alley, square 1876.....	25	17.25
1927	Girard Place NE., between Mills Avenue and Twenty-fifth Street.....	500	203.25
1905	Various sidewalks (cleaning).....		1,474.81
1907	Northwest section east of Sixteenth Street.....	444	222.01
1908	Northwest section west of Sixteenth Street.....	1,260	633.49
1910	Northeast section.....	276	138.07
1912	Georgetown section.....	35	9.00
1928	Forty-first Street NW., between Belt Road and Chesapeake Street.....	130	61.50
1933	Twenty-eighth Street NE., between Bladensburg Road and Franklin Street.....		
1934	Idaho Avenue and Ordway Street.....	70	28.50
1935	E Street NE., between Fifteenth and Sixteenth Streets, and E Street east of Sixteenth Street.....	140	59.24
1938	Allison Street NW., 30 feet west of Georgia Avenue.....	3,250	285.36
1942	East and west alley, square 2715.....	500	193.37
1932	Kenyon Street NW., between Nineteenth Street and Adams Mill Road.....	472	18.00
1939	Alley entrance, square 5537.....	15	212.38
			4.38

TABLE P.—Grading streets, alleys, and roads, appropriation, 1916—Continued.

Job No.	Location.	Grading.	Cost.
1945	Esther Place SE., between Brothers Place and alley east of Brothers Place.....	Cubic yds. 300	\$127.00
1929	Vista Street NE., between Central and Dakota Avenues.....	2,921	1,664.48
1930	Congress Road, between Nichols and Alabama Avenues.....	150	96.13
1936	Thirty-fifth Place, between T and U, and U Street, between Thirty-fifth Street and Wisconsin Avenue.....	340	186.75
1940	Piney Branch Road, between Oak Street and Spring Road.....	130	53.00
1941	Irving Street NE., 400 feet west of Twentieth Street.....	645	290.25
1944	Between Adams Mill Road, Ontario Road, and Clydendale Place.....	250	118.00
1946	Twenty-sixth Street NE., from Irving Street south of Hamlin Street.....	500	150.81
1947	Raleigh Street SE., between Seventh Street and Nichols Avenue.....	681	374.62
1948	South side Franklin Street NE., corner Twenty-second Street.....	193	87.25
1949	Thirteenth Street NE., between Irving and Jackson Streets.....	50	33.38
1950	Belmont Street NW., 100 feet west of Twentieth Street.....	238	119.75
1951	West Street SE., south of Morris Road.....	183	73.37
1952	Alley, square 3938.....	85	24.00
1954	New Central High School.....	1,645	740.65
1955	Seventh and Allison Streets NW.....	702	351.00
1956	Sterling Street, between Nichols Avenue and Brothers Place.....	401	181.00
1909	South side of T Street NE., between Lincoln Road and Second Street.....	435	174.12
1959	Quincy Street, between Cedar Avenue and Thirteenth Street.....	138	55.25
Total.....			14,216.45

REPORT OF THE SUPERINTENDENT OF STREET CLEANING.

WASHINGTON, D. C., October 4, 1916.

SIR: I have the honor to submit the following report of the street-cleaning division, engineer department, for the fiscal year ended June 30, 1916:

The operations of the street-cleaning division involve two distinct functions—the disposal of waste material originating on public property, commonly known as street cleaning, and the disposal of waste materials, originating on private property, commonly known as city wastes. The second function is just as important as the first. In order that the title may give a better and broader description of the work, Congress has been requested to appropriate for this division under the title, "Division of Street Cleaning and City Waste Disposal."

At the present time the street-cleaning work is done by the municipality directly, while the city wastes are removed by contract.

A diagram has been prepared showing the amount of material removed by the municipality as street sweepings and by the contractors as garbage, ashes, and miscellaneous refuse, as compared with the Washington Monument, in order to give some conception of the magnitude of this work, which is not generally realized. From this chart it will be noticed that were any one of these four materials piled up on a base equal to that of the monument, the height of the year's accumulation would in every case be far above its top, even though the original area were maintained throughout as opposed to the considerable taper of the monument. Were the four classes of waste to be piled one on top of the other on an equal base, the resulting accumulation would be over 4,300 feet in height, or, roughly, seven and one-half times the existing height of the monument.

To remove this amount of waste naturally requires a considerable force, especially when one considers the large area which must be worked over to obtain a wagonload of street dirt, or the number of houses which must be visited before a garbage wagon becomes filled. The maximum force employed on any one day during the past year totaled approximately 700 men and 250 vehicles, while the average daily force employed approximately 600 men and 200 vehicles.

The total funds available to carry on the work of the division totaled over half a million dollars, divided as follows:

Streets, District of Columbia, 1916, cleaning, etc.....	\$280,000
Streets, District of Columbia, 1916, disposal of city refuse.....	188,768
Salaries, office, District of Columbia, 1916.....	\$41,180
Allotment for maintenance of motor vehicles, contingent and miscellaneous expense, District of Columbia, 1916.....	4,750
Allotment for contingent expenses, contingent and miscellaneous expenses, District of Columbia, 1916.....	700
	46,630
Total amount of appropriations.....	515,398

If it were not for a revenue which the contractors obtain from the sale of materials, such as grease and fertilizer, reclaimed from the garbage; and paper, rags, bottles, metals, etc., from the refuse; this yearly appropriation would have to be about three-quarters of a million dollars, which represents the approximate present gross cost of the work.

At first glance it would seem as though this were an enormous expenditure for the cleaning of the streets and removal of the ordinary householders' wastes. The actual cost to the individual householder, however, for the entire service is comparatively small. The latest police census gives the total population as 357,749, which, divided into the total amount of appropriations given above, shows a cost per capita per annum of only \$1.44, made up as follows:

Streets, District of Columbia, 1916, cleaning, etc.....	\$0. 782
Streets, District of Columbia, 1916, disposal of city refuse.....	. 528
Salaries, office, District of Columbia, 1916.....	\$0. 115
Allotment for maintenance of motor vehicles, contingent and miscellaneous expense, District of Columbia, 1916.....	. 013
Allotment for contingent expenses, contingent and miscellaneous expenses, District of Columbia, 1916.....	. 002
	<hr/>
	. 130
Total amount per capita per annum.....	1. 440

STREET CLEANING.

The best method of cleaning streets is by hand-patrol or white-wings, supplemented by washing with either squeegees or flushers. The duty of the hand-patrolman is to remove the coarser particles before they have a chance to become crushed by the traffic into dust and to keep the gutters clean. The washing machines are intended to remove all fine dust which, with the mucus from the horse droppings and oil from motor vehicles, makes the pavements slippery when wet.

The area cleaned by this method has gradually been increased. If at present it consisted of a single street 30 feet wide, it would be approximately 211 miles in length and would extend almost from Washington to New York. The expenditure for hand-patrol work and washing represents over two-thirds of the total expenditure for street-cleaning work.

The tables herewith show that a larger area was cleaned by each method except flushing during 1916 than in 1915. The increased area cleaned by the hand-patrol and washed by squeegees is large as compared with the increases for the other classes of cleaning.

The unit costs compare very favorably with those of prior years. The fact that the unit cost of hand-patrol has remained stationary is particularly gratifying. When the new system of establishing transfer points in the alleys and eliminating the practice of leaving the bags filled with sweepings along the streets was inaugurated, it was feared that the expense of these transfer stations would increase the unit costs.

The flushers are used to clean poorly or roughly paved streets, which are necessarily scattered, so that these machines are compelled to travel long distances from one street to the other without doing any work. Some of these streets have been repaved and taken from the flushing schedule, but this has only slightly reduced the distance to be traveled and naturally increases the unit cost. The difference in cost between flushing and squeegeeing does not necessarily indicate the advantage of the squeegee over the flusher, as the work is done under entirely different conditions.

COLLECTION AND DISPOSAL OF CITY WASTES.

New contracts for the collection and disposal of city wastes, excepting night soil, went into effect July 1, 1915. The specifications of these contracts were practically the same as those of the preceding contracts, several minor points having been altered to prevent possible ambiguities. The change of greatest importance required the contractor to notify the householder and report to this office whenever material was refused because of it being mixed, in unlawful receptacles, or frozen. Under the old contracts considerable difficulty was experienced because of the collectors' refusing to remove material without notifying the householder or this office. In many cases the householder could not imagine why material had been refused and generally hired a private collector or, worse still, let the material accumulate for several weeks. Under the present system any mixed material reported to this office is investigated by our inspectors and the householders notified officially that the material must be separated in accordance with the police regulations if they wish the municipality to make removal.

The following table gives a comparison of the old and new contract prices:

Contract for collection and disposal of—	Date.	Period.	Contractor.	Price per annum.	Previous price per annum.
Garbage.....	Dec. 23, 1914	July 1, 1915, to June 30, 1918.	Washington Fertilizer Co.	\$69,840	\$68,400
Miscellaneous refuse.....	do.....	do.....	M. R. Ready.....	28,400	17,000
Ashes.....	do.....	July 1, 1915, to June 30, 1916.	J. W. Bean Contracting Co.	69,000	73,150
Dead animals.....	Nov. 24, 1914	July 1, 1915, to June 30, 1918.	C. F. Mann.....	2,988	2,855
Ashes and refuse, buildings under control of commissioners.	May 18, 1915	July 1, 1915, to June 30, 1916.	J. W. Bean Contracting Co.	(1)	(2)

¹ 36 cents per cubic yard.

² 41 cents per cubic yard.

The contracts for the collection and disposal of ashes, and for the collection and disposal of ashes and rubbish from buildings under the control of the commissioners, expired on June 30, 1916. New contracts were entered into with Charles E. Myers for the collection and disposal of ashes at \$60,000 per annum for a period of two years, and for the collection and disposal of ashes and rubbish from buildings under the control of the Commissioners of the District of Columbia at 38 cents per cubic yard for a period of one year.

Bids on these two contracts were opened on April 20, 1916, the bidders being as follows:

Bidders.	Ashes.	Ashes from public buildings.
L. M. Johnston:		
1 year.....per annum.....	73,885	47 cents per cubic yard.
2 years.....do.....	76,385	
Alternate bid—		
1 year.....do.....	73,885	
2 years.....do.....	76,385	
Charles E. Myers:		
1 year.....do.....	66,000	38 cents per cubic yard.
2 years.....do.....	60,000	
Alternate bid—		
1 year.....do.....	64,000	
2 years.....do.....	64,000	

The alternate bid provided that collections during the summer months be made only upon notice from the superintendent of street cleaning, not oftener than once per week from any particular residence. It was believed that this proviso would result in material reductions in the bids.

The table herewith gives a comparison of the number of complaints investigated by this division during the past two years:

	Garbage.				Ashes.				Refuse.			
	1915	Per cent.	1916	Per cent.	1915	Per cent.	1916	Per cent.	1915	Per cent.	1916	Per cent.
Complaints:												
Fault of contractor.....	51	9	49	11	173	15	130	15	337	22	271	19
Fault of householder.....	214	38	132	29	463	42	255	29	640	41	464	32
Doubtful.....	291	53	276	60	476	43	484	56	585	37	724	49
Total complaints.....	556	100	457	100	1,112	100	869	100	1,562	100	1,459	100
Total requests.....	165	111	.....	415	.....	278	.....	316	.....	250	.....	.....
Grand total.....	721	.....	568	.....	1,527	.....	1,147	.....	1,878	.....	1,709	.....

It will be noticed that the reduction in complaints investigated is almost entirely in those found to be the fault of the householder. It is believed that this reduction is due primarily to the contract provision in regard to mixed material described in a previous paragraph. This provision has added materially to the effectiveness of the inspection force, as it immediately locates for our inspectors householders who, through ignorance or otherwise, violate the police regulations in regard to the separation of material. Over 99 per cent of such cases are due to ignorance of the regulations.

The appropriation for the fiscal year 1915 included an item of \$7,500 for the purposes of investigating and reporting on the collection and disposal of garbage and other city wastes originating in the District of Columbia, including the preparation of plans and specifications for the construction of disposal plants, the necessary accessories, and the employment of personal services and such other incidental expenses as might be necessary to carry out the purposes of the appropriation. A contract was entered into, on October 19, 1914, with Mr. Irwin S. Osborn, of Cleveland, Ohio. Mr. Osborn began work on this contract about December 1, 1914, filed a preliminary report with the commissioners on June 30, 1915, and the final report on October 1, 1915. In the attempt to carry out the recommendations embodied in Mr. Osborn's report the commissioners included in their estimates to Congress for the fiscal year ending June 30, 1917, an item of \$885,900 to build disposal plants, purchase equipment, etc., to begin municipal collection and disposal of city wastes when the present contracts expire, June 30, 1918.

This item was eliminated from the District appropriation bill and a separate bill introduced. This bill was favorably reported by a subcommittee of the District Committee, but was not reported to the House.

That any objection to the contemplated plan of municipal collection and disposal of city wastes can not be based on the economy of the present system is clearly indicated by the following extract from Mr. Osborn's report:

"The net annual cost to the District in 1925, as estimated for the recommended project, amounts to \$137,658, including interest and depreciation. The amount required to collect and dispose of municipal waste by present contracts is \$191,620 per year. Assuming that the cost by contract under present conditions will not increase, there would be a saving of \$53,962 per year if the work was done by the District at the estimated cost for 1925. If this amount was set aside as a sinking fund each year with interest at 3½ per cent, it would only require approximately 13 years to amortize the total capital investment of \$885,900, so that after this period not only would the capital investment be paid off but the District would own the plants in practically as good condition as when new."

Your attention is invited to the detailed information submitted herewith.

Very respectfully,

J. W. PAXTON,
Superintendent of Street Cleaning.

Capt. J. J. LOVING,
*Corps of Engineers, United States Army,
Assistant to the Engineer Commissioner, District of Columbia.*

Table showing comparative data in connection with street-cleaning work, 1912 to 1916.

SQUARE YARDS CLEANED.

	1912	1913	1914	1915	1916
Hand patrol.....	646,377,000	766,918,000	\$35,588,000	1,027,020,000	1,052,765,000
Machine sweeping.....	337,990,000	286,067,000	267,557,000	217,235,000	218,852,000
Alley cleaning.....	51,664,000	61,354,000	58,674,000	66,206,000	67,842,000
Suburban streets.....	27,825,000	43,595,000	31,296,000	43,549,000	50,127,000
Squeegeeing.....	88,328,000	144,629,000	144,878,000	167,754,000	187,794,000
Flushing.....	8,747,000	20,703,000	22,424,000	26,304,000	23,696,000

DIRECT TOTAL COST.

	1912	1913	1914	1915	1916
Hand patrol.....	\$98,132.85	\$117,980.15	\$116,921.65	\$135,553.98	\$138,571.03
Machine sweeping.....	54,623.72	46,088.96	41,756.07	32,378.12	31,405.83
Alley cleaning.....	17,752.45	19,908.48	19,795.31	21,914.70	22,155.20
Suburban streets.....	14,559.76	18,552.80	13,591.99	14,269.23	15,900.32
Squeegeeing.....	9,407.58	17,026.64	17,478.55	19,337.40	20,037.40
Flushing.....	2,385.84	5,148.78	5,210.98	5,099.30	5,033.32

Table showing comparative data in connection with street-cleaning work, 1912 to 1916—Continued.

COST PER 1,000 SQUARE YARDS.

	1912	1913	1914	1915	1916
Hand patrol.....	\$0.152	\$0.154	\$0.140	\$0.132	\$0.132
Machine sweeping.....	.162	.161	.156	.149	.144
Alley cleaning.....	.324	.325	.337	.331	.326
Squeegeeing.....	.096	.117	.121	.115	.106
Flushing.....	.272	.248	.232	.194	.212

NOTE.—Changes and improvements in methods of measuring and distribution prevent exact comparison between the figures for different years. The above costs include only labor pay rolls; forage, shoeing, and other stable expenses; supplies, such as brooms, shovels, etc.; and repairs to equipment.

Total cost of street cleaning, including all charges, except interest on investment and depreciation.....	\$297,317.19
Population served.....	357,749
Cost per capita per year.....	\$0.831

Table showing comparative data in connection with disposal of all city wastes from 1912 to 1916.

NUMBER OF UNITS COLLECTED.

	1912	1913	1914	1915	1916
Garbage.....tons.....	47,445	50,778	48,927	50,806	52,207
Ashes.....cubic yards.....	203,568	200,430	255,358	148,190	135,305
Miscellaneous refuse.....do.....	115,378	138,382	140,683	146,152	157,180
Night soil.....barrels.....	21,266	19,895	15,514	12,949	12,741
Dead animals.....number.....	17,492	21,287	19,148	20,570	22,724

TOTAL NET COST.

Garbage.....	\$68,384.00	\$68,388.00	\$68,384.00	\$68,374.00	\$69,788.00
Ashes.....	73,053.00	73,129.00	73,007.00	73,041.00	68,935.00
Miscellaneous refuse.....	16,560.00	16,593.00	16,583.50	16,609.00	28,187.00
Night soil.....	16,600.00	16,600.00	14,962.00	14,996.00	14,990.00
Dead animals.....	2,855.00	2,855.00	2,853.00	2,855.00	2,988.00

COST PER UNIT.

Garbage, per ton.....	\$1.44	\$1.34	\$1.39	\$1.34	\$1.34
Ashes, per cubic yard.....	.36	.36	.29	.49	.51
Miscellaneous refuse, per cubic yard.....	.14	.12	.12	.11	.18
Night soil, per barrel.....	.78	.83	.96	1.16	1.17
Dead animals, each.....	.163	.134	.149	.14	.13

FINES DEDUCTED.

Garbage.....	\$16.00	\$12.00	\$16.00	\$26.00	\$52.00
Ashes.....	97.00	21.00	143.00	109.00	65.00
Miscellaneous refuse.....	440.00	407.00	416.50	391.00	213.00
Night soil.....	.....	.....	38.00	4.00	10.00
Dead animals.....	.....	.....	2.00	.....	.....

NOTE.—The reduction in cubic yards of ashes collected is due to the reports of previous years being in error. The amount collected during the past two years is probably below the average because of the mild winters, but checks on the amount reported collected by the contractor during the summer of 1914 indicate that too large an amount had previously been reported.

Miscellaneous data, street-cleaning work.

Class of work.	Territory under attention.		Character of territory under attention.	Interval of cleanings, etc.	Force employed, etc.
	July 1, 1915.	June 30, 1916.			
Machine brooming.....	Sq. yds. 1,552,179	Sq. yds. 1,501,735	All paved streets outside hand-patrol area.	Daily, every other day, or every third day, depending on location and traffic.	2 gangs, totaling 3 two-horse sprinklers, 9 two-horse brooms, 11 one-horse carts, and 12 broomers.
Alley cleaning.....	1,090,252	1,120,095	All paved alleys in District.....	About once each week; alleys in business section, with heavy traffic, twice each week.	3 gangs, totaling 3 one-horse sprinklers, 5 one-horse brooms, 11 one-horse carts, and 17 broomers.
Suburban cleaning.....	1,592,620	1,639,681	Macadam, gravel, and unpaved streets in suburbs, unpaved public alleys.	About once every 10 days.....	2 gangs, totaling 2 one-horse sprinklers, 8 one-horse carts, and 22 laborers.
Hand patrolling.....	3,666,400	3,731,092	All streets in the central portion of the city.	From 1 to 8 or 10 times each day, depending on location and traffic.	6 gangs, totaling 14 two-horse wagons and 271 white wings.
Flushing.....	372,272	341,622	Cobblestone, granite, asphalt block, and poorly paved streets in hand-patrol area.	About every three days; dirt flushed to gutter removed by hand patrol.	1 gang of 3 three-horse pneumatic type, flushing machines.
Squeegeeing.....	2,149,703	2,353,058	Nearly all of the smoothly paved streets in hand-patrol area.	About every two days in summer, three in winter; dirt removed by hand patrol.	3 gangs, totaling 3 two-horse sprinklers, 12 two-horse squeegees, and 1 three-horse squeegee.
Dust prevention; oiling.....	938,492	1,161,937	Coating of practically all the better class of suburban streets with emulsion road oil.	About 10 times per season.....	Varied from 1 two-horse spreader wagon and 2 two-horse supply wagons.
Dust prevention; sprinkling.....	(1)	(1)	Practically all suburban streets not oiled; heavy-oil streets in bad condition, etc.	About twice each day, weather permitting.	Varied from 2 to 6 two-horse sprinklers.

1 Indefinite; depends on season, weather, etc.

Miscellaneous data, street-cleaning work—Continued.

Class of work.	Material removed.			Average force per working day of 8 hours.							Days worked.	
	Loads.	Estimated cubic yards.	Estimated tons.	Carts.	Wagons.	Sprinklers.	Machine brooms.	Squeegee.	Flusher.	Men.	Calendar.	Actual 8 hour.
Machine brooming.....	9,541	21,069	10,534	11.4	.....	3.0	9.1	.....	.....	35.5	276	273.4
Alley cleaning.....	5,313	7,969	5,313	10.2	.....	2.8	2.0	.....	.....	33.5	276	273.6
Suburban cleaning.....	9,505	9,505	9,505	8.1	.....	.2	.....	.....	.....	29.4	264	262.1
Hand patrolling.....	16,302	65,208	32,604	.....	15.0	.....	.....	.....	.....	284.0	292	285.8
Flushing.....	.....	.....	.....	.....	.....	.....	.....	.....	3.0	3.0	251	245.8
Squeegeeing.....	.....	.....	.....	.....	.....	2.6	.....	11.5	.....	14.1	269	261.2
Dust prevention, oiling.....	.....	.....	.....	.....	.....	4.4	.....	.....	.....	5.0	101	99.2
Dust prevention, sprinkling.....	.....	.....	.....	.....	.....	2.9	.....	.....	.....	2.9	254	235.3
Snow and ice.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	510.0	8	4.5

Miscellaneous data; collection and disposal of city wastes.

Class of waste.	Contractor.	Period of contract.	Date of expiration.	Price per annum.	Collected from—
Garbage.....	Washington Fertilizer Co.	3 years.	June 30, 1918	\$69,840.00	All places producing garbage.
Ashes.....	James W. Bean Contracting Co.	1 year..	June 30, 1916	69,000.00	Residences, small boarding and lodging houses, small apartments.
Refuse.....	Michael R. Ready.	3 years.	June 30, 1918	28,400.00	Residences, small lodging and boarding houses, small apartments.
Dead animals....	Charles F. Mann..	...do....	.....do.....	2,988.00	Every part of the District.
Night soil.....	Warner-Stutler....	5 years.	.....do.....	15,000.00	All privies in the District.
Ashes and refuse from public buildings.	James W. Bean Contracting Co.	1 year..	June 30, 1916	1.36	Public buildings under control of commissioners.

1 Per cubic yard.

Miscellaneous data; collection and disposal of city wastes—Continued.

Class of waste.	Hotels, markets and apartment houses.	City proper and more thickly settled suburbs.		Outlying suburbs.		Manner of collection.	Manner of disposal.	Location of disposal plant.
		Summer.	Winter.	Summer.	Winter.			
Garbage.....	Daily and Sunday throughout year.	Daily	3 per week...	3 per week...	2 per week...	Horse-drawn vehicles carrying covered metal tanks. Horse-drawn bottom-dump wagons, canvas covers. Horse-drawn flat wagons, canvas covers.	Filled tanks are transported by rail to reduction plant owned by contractor. Used as fill on low ground in outskirts of city. Salable portion picked out. Residue put through incinerator owned by contractor and ashes therefrom used as fill.	Cherry Hill, Va., about 32 miles from city. None. Twenty-sixth and Benning Road N.E., about 2½ miles from city. Four-Mile Run, Va., about 4 miles from city. None.
Ashes	Not collected.....	1 per week...	2 per week...	1 per week...	1 per week...			
Refuse.....	.....do.....	.....do.....	1 per week...	.....do.....	.....do.....			
Dead animals.....	Collected within 8 hours in winter and 6 hours in summer after notice from the superintendent of street cleaning.					Automobile with closed body for small animals; horse-drawn special wagons for large.	Hauled in vehicle making collection to reduction plant owned by contractors.	
Night soil.....	Collected within 48 hours after receipt of notice from the superintendent of street cleaning.					Horse-drawn vehicle with special air-tight receptacles.	Transferred in these receptacles on barges to farm about 3 miles from city and used as fertilizer.	
Ashes and refuse from public buildings.	Collected within 48 hours after receipt of notice from the superintendent of street cleaning.					Horse-drawn bottom-dump wagons, canvas covers.	Used as fill on low ground in outskirts of city.	Do.

REPORT OF THE INSPECTOR OF ASPHALTS AND CEMENTS.

WASHINGTON, August 30, 1916.

SIR: I have the honor to submit the following report showing operations of this office during the fiscal year ending June 30, 1916:

In the total number of samples tested there was a slight decrease from the previous year—14,475 as against 14,785—due principally to completion of the Q Street Bridge in the early part of the year, thereby making further tests of cement for use therein unnecessary. In most all other classes of materials submitted there was an increase.

The Washington Asphalt Block & Tile Co., manufacturers of asphalt block used by the District, and whose plant was destroyed by fire in January, 1914, resumed operation October last.

Asphalt pavements.—During the year there were laid by the Cranford Paving Co., contractors for repairing and resurfacing asphalt pavements, approximately 67,862 square yards, in which there was used exclusively Bermudez and Aztec asphalts. The Warner-Quinlan Asphalt Co., contractors for laying of new asphalt, paved about 74,326 square yards, in which Montezuma asphalt was exclusively used. Present conditions of streets laid during the year leads the office to believe that the asphalts used will prove satisfactory.

Portland cement.—Tested 12,816 samples, representing 128,165 barrels. Results of test and by whom submitted are shown in Tables Nos. 12 and 13, accompanying.

During the year there have been designed by the office several new pieces of apparatus—one for use in determining voids in sand and stone; special thermometers, etc. These the office have had manufactured, and they are proving satisfactory.

All work has been kept current and is current to date.

Very respectfully,

J. O. HARGROVE,

Inspector of Asphalts and Cements.

Capt. J. J. LOVING,

Corps of Engineers, United States Army,

Assistant to Engineer Commissioner,

District of Columbia.

Total number of samples tested.

Asphalts:	
Aztec.....	26
Bermudez.....	2
Mexican oil asphalt.....	3
Montezuma.....	31
Standard.....	15
Texaco.....	1
Lake Trinidad (crude).....	1
Asphalt mixtures:	
Binder.....	15
Block.....	49
Block mixture.....	43
Cement (binder).....	127
Cement (block).....	60
Cement (topping).....	153
Concrete mixtures.....	34
Cement (District of Columbia asphalt plant).....	238
Topping mixtures.....	322
Topping (old surface material).....	8
Cement, Portland.....	12, 816
Oils:	
Flux.....	4
Fuel.....	5
Residuum.....	3
Road.....	12
Pitch, paving.....	3
Sands.....	189
Stone:	
Binder.....	139
Limestone dust.....	48
Trap-rock screenings.....	18
Tar.....	6
Miscellaneous.....	104
Total.....	14, 475

ASPHALTS.

Chemical and physical examination of asphalts used in laying and repairing of pavements in the District of Columbia shown in the following tables:

From Cranford Paving Co.:

- 36 samples Aztec, refined, representing 740 tons.
- 2 samples Bermudez, refined, representing 125 tons.
- 3 samples Mexican oil asphalt, refined, representing 90 tons.

	Aztec.	Bermudez.	Mexican oil asphalt.
Penetration:			
At 32° F.....	22	.....	19
At 77° F.....	59	22	60
At 115° F.....	250	191	Soft.
Bitumen soluble in CS ₂.....per cent..	99.78	93.85	99.80
Organic matter insoluble.....do.....	.07	2.14	.09
Ash.....do.....	.15	4.01	.11
Specific gravity at 60° F.....	1.054	1.086	1.054
Ductility at 77° F.....	¹ 50+cm.	21 cm.	¹ 50+cm.
Penetration before heating.....	59	22	60
Penetration after heating, 300° F., 18 hours.....	40	15	40
Asphalt cement hardens.....per cent..	31.28	31.81	33.33
Asphalt cement loses.....do.....	.14	1.83	.07

¹ Limit of ductility machine.

Municipal asphalt plant: 15 samples standard asphalt, representing 473 tons.

	Standard.		Standard.
Penetration at 77° F.....	55	Penetration before heating.....	55
Bitumen soluble in CS ₂.....per cent..	99.77	Penetration after heating, 300° F., 7 hours.....	43
Organic matter insoluble.....do.....	.11	Asphalt cement hardens.....per cent..	21.81
Ash.....do.....	.12	Asphalt cement loses.....do.....	.15
Specific gravity at 60° F.....	1.045	Flash (°F.).....	495
Ductility at 77° F.....	¹ 50+cm.	Burns (°F.).....	600

¹ Limit of ductility machine.

From Washington Asphalt Block & Tile Co.:

- 1 sample Lake Trinidad, crude, representing 1,000 tons.
- 1 sample Texaco, refined, representing 300 tons.

	Lake Trinidad refined (solid).	Texaco.
Penetration:		
At 32° F.....	.....	15
At 77° F.....	.....	39
At 115° F.....	.....	154
Bitumen soluble in CS ₂.....per cent..	54.96	99.66
Organic matter insoluble.....do.....	8.27	.16
Ash.....do.....	36.77	.18
Specific gravity at 60° F.....	.....	1.054
Ductility at 77° F.....	.....	¹ 17 cm
Brittleness at 32° F.....	.....	39
Penetration before heating.....	.....	36
Penetration after heating, 300° F., 18 hours.....	.....	7.7
Asphalt cement hardens.....per cent..	.....	0.0
Asphalt cement loses.....do.....	.....	520
Flash (°F.).....	.....	600
Burns (°F.).....	.....	122
Flow point (°F.).....	.....	.....

¹ Limit of ductility machine.

From Warner-Quinlan Asphalt Co.: 31 samples Montezuma, refined, representing 928 tons.

	Monte- zuma.		Monte- zuma.
Penetration:		Specific gravity at 60° F.....	1.046
At 32° F.....	19	Ductility at 77° F.....	¹ 50+cm.
At 77° F.....	53	Penetration before heating.....	53
At 115° F.....	247	Penetration after heating, 300° F., 18 hours.....	41
Bitumen soluble in CS ₂.....per cent..	99.80	Asphalt cement hardens.....per cent..	22.64
Organic matter insoluble.....do.....	.08	Asphalt cement loses.....do.....	.21
Ash.....do.....	.12		

¹ Limit of ductility machine.

ASPHALT CEMENTS.

Table showing penetration results of asphalt cements used in asphalt binder, block, concrete, and topping used by the contractors and municipal asphalt plant.

[Penetration at 77° F.]

	Cranford Paving Co.					
	Bermudez.		Aztec.		Mexican oil asphalt.	
	Binder.	Topping.	Binder.	Topping.	Binder.	Topping.
Number of samples.....	23	21	50	53	1	2
Highest test:						
Office.....	57	57	60	60	56	57
Yard.....	57	57	60	60	61	61
Lowest test:						
Office.....	48	49	49	50	56	56
Yard.....	50	50	50	50	61	60
Average of all samples tested:						
Office.....	52	52	54	55	56	56
Yard.....	53	53	56	56	61	60

	Municipal asphalt plant.		Washington Asphalt Block & Tile Co.	
	Standard.	Sun Co.	Lake Trinidad and Texaco, block.	Lake Trinidad, block.
Number of samples.....	213	25	13	47
Highest test:				
Office.....	60	66	21	24
Yard.....			24	25
Lowest test:				
Office.....	42	39	18	16
Yard.....			18	19
Average of all samples tested:				
Office.....	53	48	19	19
Yard.....			22	21

	Montezuma.	
	Binder.	Topping.
Warner-Quinlan Asphalt Co.:		
Number of samples.....	53	77
Highest test—		
Office.....	60	63
Yard.....	60	63
Lowest test—		
Office.....	49	48
Yard.....	50	50
Average of all samples tested—		
Office.....	56	54
Yard.....	55	56

BINDER STONE.

During the year there were examined 139 samples of binder stone used in the laying and making repairs to asphalt pavements, representing 9,645 cubic yards, of which 118 cubic yards were rejected on account of inferior quality, softness of stone, and excess of dirt.

	Samples received.		Rejections.	
	Number.	Cubic yards.	Number.	Cubic yards.
Cranford Paving Co.....	43	4,956	1	118
Warner-Quinlan Asphalt Co.....	96	4,571		

ASPHALT BINDER MIXTURE.

Analysis of six samples taken from the Cranford Paving Co. and 9 samples taken from the Warner-Quinlan Asphalt Co. showed an average of bitumen soluble in carbon bisulphide as follows:

	Number of samples.	Bitumen soluble in carbon bisulphide.
Cranford Paving Co.....	6	<i>Per cent.</i> 3.9
Warner-Quinlan Asphalt Co.....	9	3.3

ASPHALT TOPPING MIXTURES.

During the year there were 322 samples collected from the Cranford Paving Co.; municipal asphalt plant, and Warner-Quinlan Asphalt Co., for examination, and analysis. The following tables show the maximum, minimum, and average per cent bitumen contained and the average mesh composition of mineral aggregate used:

	Number of samples.	Per cent bitumen.		
		Highest.	Lowest.	Average.
Cranford Paving Co.:				
Aztec.....	53	12.5	10.0	11.2
Bermudez.....	20	12.1	10.0	11.3
Mexican oil asphalt.....	2	11.1	10.8	10.9

Mesh composition of aggregate used in mixture.

	Percent.
Retained on sieves having—	
20 mesh per linear inch.....	3.6
40 mesh per linear inch.....	22.5
60 mesh per linear inch.....	30.6
80 mesh per linear inch.....	16.5
100 mesh per linear inch.....	7.6
Passing 100 mesh per linear inch.....	19.2

	Number of samples.	Per cent bitumen.		
		Highest.	Lowest.	Average.
Municipal asphalt plant:				
Standard asphalt.....	181	11.9	7.6	9.9
Sun Co.....	21	10.6	8.3	9.5

Mesh composition of aggregate used in mixture.

Retained on sieve having—	Percent.
1/4-inch mesh.....	3.6
8 mesh per linear inch.....	9.4
10 mesh per linear inch.....	2.1
20 mesh per linear inch.....	6.4
40 mesh per linear inch.....	25.9
60 mesh per linear inch.....	26.4
80 mesh per linear inch.....	8.4
100 mesh per linear inch.....	4.4
Passing 100 mesh per linear inch.....	13.4

	Number, of samples.	Per cent bitumen.		
		Highest.	Lowest.	Average.
Warner-Quinlan Asphalt Co., Montezuma asphalt.....	77	11.2	10.5	10.7

Mesh composition of aggregate used in mixture.

Retained on sieve having—	Percent
20 mesh per linear inch.....	3.5
40 mesh per linear inch.....	24.5
60 mesh per linear inch.....	24.2
80 mesh per linear inch.....	15.3
100 mesh per linear inch.....	8.6
Passing 100 mesh per linear inch.....	23.9

ASPHALT BLOCK.

About 298,270 paving block manufactured by the Washington Asphalt Block & Tile Co., of which 131,770 were 2-inch block and 166,500 were 4-inch block, used in the paving of avenues, streets, and alleys in this city during the year; in the manufacture of which there was used Trinidad Lake asphalt fluxed with petroleum residuum and Trinidad Lake asphalt 65 parts, Texaco 35 parts, fluxed with petroleum residuum and using a mineral aggregate composed of Potomac granite, trap rock, limestone screenings, and limestone dust.

ASPHALT CEMENT.

	Lake Trinidad.	Lake Trinidad and Texaco.
Bitumen soluble in carbon bisulphide..... per cent..	63.50	71.87
Penetration at 77° F., 100 grams.....	19.	19
Per cent of hardening after heating 300° F. for 18 hours..... per cent..	.0	5.24
Per cent of loss after heating 300° F. for 18 hours..... do.	.4	.75
Brittleness in centimeters, drop of 25-gram weight at 32° F.....	17	15

Block.

Specific gravity:	
Manufactured 2-inch block.....	2.451
Manufactured 4-inch block.....	2.423
Bitumen soluble in carbon bisulphide:	Percent.
2-inch block.....	7.0
4-inch block.....	8.0
Mesh composition of mineral aggregate:	
Retained on 1/4-inch mesh sieve.....	0.1
Retained on 20 mesh per linear inch.....	53.0
Retained on 100 mesh per linear inch.....	20.8
Passing 100 mesh per linear inch.....	26.1

LIMESTONE DUST USED IN SURFACE MIXTURE.

This material is used as a filler to reduce the void in the sand used in asphalt surface mixtures and crushed stone in block mixtures. During the year there were examined 48 samples, all of which passed the required degree of fineness—i. e., all to pass the 30 and not less than 85 per cent to pass the 100-mesh sieve.

	Samples.	Tons.
Cranford Paving Co.....	12	300
Municipal asphalt plant.....	6	175
Washington Asphalt Block & Tile Co.....	12	300
Warner-Quinlan Asphalt Co.....	18	450

SAND USED IN SURFACE MIXTURE.

Of this material 189 samples representing 23,360 cubic yards were inspected of which 11,370 cubic yards were rejected on account of coarseness and excessive percentage of mud.

	Number of samples.	Cubic yards accepted.	Cubic yards rejected.
Cranford Paving Co.....	134	6,500	10,250
Municipal asphalt plant.....	17	2,160	.....
Warner-Quinlan Asphalt Co.....	38	3,625	1,125

PETROLEUM RESIDUUM.

Residuum used during the year by the contractor in the preparation of asphalt cement was the product of the Standard Oil Co. Three samples were submitted by the contractor for test and examination, which showed the following:

	Samples.	Pounds.
Washington Asphalt Block & Tile Co.....	3	120,000

Washington Asphalt Block & Tile Co.:

Specific gravity—		
Highest.....		0.9729
Lowest.....		.9353
Average.....		.9532
Gravity (Bé)—		
Highest.....		17.7
Lowest.....		13.9
Average.....		16.9
Flash (°F.)—		
Highest.....		475
Lowest.....		385
Average.....		425
Burns (°F.)—		
Highest.....		515
Lowest.....		475
Average.....		495
Loss at 400° F., for 18 hours—		
Highest.....		8.00
Lowest.....		2.48
Average.....		4.4

ASPHALT FLUX.

All flux used during the year by the contractors in the preparation of asphalt cement was the product of the Barber Asphalt Paving Co. and the Warner-Quinlan Asphalt Co. A total of four samples were submitted by the contractors for test and examination, which showed the following:

	Samples.	Pounds.
Cranford Paving Co.....	2	120,000
Warner-Quinlan Asphalt Co.....	2	120,000

	Cranford Paving Co., Trinidad Asphalt Flux.	Warner- Quinlan Co., Montezuma Asphalt Flux.
Specific gravity:		
Highest.....	1.004	1.007
Lowest.....	1.003	.9878
Average.....	1.003	.9974
Gravity (Bé):		
Highest.....	0.6	1.0
Lowest.....	0.5	11.7
Average.....	0.5	6.3
Flash (°F.):		
Highest.....	400	375
Lowest.....	395	370
Average.....	395	370
Burns (°F.):		
Highest.....	455	435
Lowest.....	440	405
Average.....	445	420
Loss at 400° F., for 18 hours:		
Highest.....	2.76	3.70
Lowest.....	2.0	2.70
Average.....	2.38	3.2

ASPHALT SURFACE MIXTURE (ASPHALT CONCRETE), MUNICIPAL ASPHALT PLANT.

During the year there were examined 34 samples of asphalt concrete, representing about 6,288 cubic yards. This material was a mixture composed of trap-rock screenings, 45 per cent; building sand, 44 per cent; limestone dust, 4 per cent; asphalt cement, 7 per cent; (penetration at 77° F., 100 grams, 5 seconds, 57). The average mesh composition of this mineral aggregate is shown in the table below. The stone, sand, and limestone dust were heated to a temperature about 350° F. in the heating drum of a Warren portable asphalt mixer. The hot asphalt was added and the whole thoroughly mixed for about 5 minutes. It was then discharged into carts and hauled to the site of work, which consisted principally of repairs to asphalt pavements. Examination of the material produced showed an average of bitumen soluble in carbon bisulphide of 7.3 per cent.

MINERAL AGGREGATE MESH COMPOSITION.

Retained on—	Per cent.
1/4-inch mesh.....	0.8
1/2-inch mesh.....	6.6
8 mesh per linear inch.....	16.8
10 mesh per linear inch.....	4.4
20 mesh per linear inch.....	10.5
40 mesh per linear inch.....	22.2
60 mesh per linear inch.....	19.6
80 mesh per linear inch.....	6.3
100 mesh per linear inch.....	3.5
Passing 100 mesh per linear inch.....	9.3

ASPHALT SURFACE MIXTURE TOPPING, MUNICIPAL ASPHALT PLANT.

There were examined 178 samples of topping mixture, representing about 28,320 cubic yards. This material was a mixture composed of old asphalt surface mixture (topping and binder), which, after being removed from the street, was hauled to the municipal asphalt plant and crushed in a Noyes rotary crusher to a fineness ranging from 1 inch to dust; to this material were then added trap-rock screenings, fine sand, limestone dust, and asphalt cement about the following proportions: Old asphalt surface material, 66 per cent; fine sand, 23 per cent; traprock screenings, 6 per cent; limestone dust, 2 per cent; asphalt cement, 3 per cent (penetration at 77° F., 5 seconds, 100 grams 56), the whole being mixed as above described under asphalt concrete and used for the same purpose.

Following are results of tests showing percentage of asphalt and mesh composition of mineral aggregate of old asphalt surface material and topping mixture after production.

Old asphalt surface mixture (after crushing).

	Per cent.
Bitumen soluble in carbon bisulphide.....	5.9

Mineral aggregate mesh composition.

Retained on—	Per cent.
¾-inch mesh.....	2.7
½-inch mesh.....	11.8
¼-inch mesh.....	18.7
8 mesh per linear inch.....	10.6
10 mesh per linear inch.....	1.7
20 mesh per linear inch.....	3.9
40 mesh per linear inch.....	14.0
60 mesh per linear inch.....	15.9
80 mesh per linear inch.....	5.7
100 mesh per linear inch.....	3.2
Passing 100 mesh per linear inch.....	11.9

Topping mixture after production.

	Per cent.
Bitumen soluble in carbon bisulphide.....	9.8

Mesh composition mineral aggregate.

Retained on—	Per cent.
¾-inch mesh.....	3.6
8 mesh per linear inch.....	9.4
10 mesh per linear inch.....	2.1
20 mesh per linear inch.....	6.4
40 mesh per linear inch.....	25.9
60 mesh per linear inch.....	26.4
80 mesh per linear inch.....	8.4
100 mesh per linear inch.....	4.4
Passing 100 mesh per linear inch.....	13.8

HYDRAULIC CEMENTS.

Number of barrels inspected and the average results of tests on same—Portland cement.

	Dragon.	Old Dominion.	Saylor's.	Security.	Tide-water.	Vulcanite.
Number of barrels.....	230	2,100	135	11,120	102,610	8,970
Number of samples.....	23	210	13	1,412	10,261	897
Fineness passing 100-mesh sieve, per cent.....	95.7	97.6	97.8	96.3	95.5	95.7
Fineness passing 200-mesh sieve.....do.....	79.6	82.3	80.9	81.3	80.0	79.4
Initial set (hours and minutes).....	3.30	4.50	4.20	4.15	5.50	5.30
Hard set (hours and minutes).....	5.10	6.20	6.10	6.15	7.50	7.40
Per cent water used:						
Neat cement.....	24.0	23.4	23.0	22.5	21.8	22.5
3 parts Ottawa sand.....	10.5			10.2	10.2	10.2
Temperature of air and water.....	85	79	87	78	78	81
Tensile strength in pounds per square inch:						
Neat—						
1 day.....	493	462	330	365	358	343
7-day.....	740			635	689	706
28-day.....				736	841	
Sand—						
1:3, 7-day.....	272			285	285	298
1:3, 28-day.....				361	375	
Specific gravity.....	3.153	3.149	3.153	3.150	3.183	3.182

In the testing of cement, samples are taken from 10 barrels of each 100-barrel lot and tested individually. The 12,816 samples tested represent 128,165 barrels of which 300 were rejected.

Number of barrels of cement tested and by whom submitted.

Cranford Paving Co.:		
Dragon.....	230	
Vulcanite.....	8, 970	
		9, 200
District of Columbia, Tidewater.....		93, 000
E. G. Gummel, Tidewater.....		5, 810
Municipal fish wharf, Tidewater.....		1, 400
Pennsylvania Avenue Bridge:		
Old Dominion.....	400	
Security.....	2, 600	
		3, 000
Q Street Bridge, Saylor's.....		135
Washington Asphalt Block & Tile Co., Tidewater.....		2, 400
Warner-Quinlan Asphalt Co.:		
Security.....	11, 520	
Old Dominion.....	1, 700	
		13, 220
Total.....		128, 165

REPORT OF THE SURVEYOR.

WASHINGTON, October 5, 1916.

SIR: I have the honor to submit the following report concerning the work of this office, including the extension of streets and avenues (see separate report of the assistant surveyor) for the year ended June 30, 1916:

SURVEYS MADE FOR WHICH FEES ARE CHARGED.

The code provides that work of this character shall be charged for in accordance with a schedule of fees prescribed by the commissioners, and that the surveyor shall, as speedily as possible, execute any order for work made by the court or private individuals of any land within the District of Columbia and shall make due return and certificate thereof.

The total amount collected for this class of work was \$15,005.15, against \$12,817.95 for the previous year. The orders for this class of work by various individuals and corporations numbered 3,756, against 3,017 for the previous year. The number of individual lots surveyed was 2,160, against 1,561 the previous year. Buildings under construction inspected as to the location of foundations and walls numbered 1,741, against 1,535 for the previous year. Eleven large tracts of agricultural land have been surveyed and subdivided. These figures show a very substantial increase in revenue as well as in the amount of work actually performed.

This class of work consists of surveying building lots for purposes of construction; locating all new buildings to determine their correct location as required by the building regulations; determining party and property lines; certifying as to the position of buildings for title companies and private owners; surveying city and agricultural land to determine areas and furnishing descriptions, etc.; subdividing property into lots, squares, etc.; making plats as required by the regulations to accompany applications for permits to build; drawing of radius plats to accompany applications for permits for theaters, garages, etc.

SURVEYS FOR THE FEDERAL GOVERNMENT AND THE DISTRICT OF COLUMBIA.

In addition to private work, this office also makes surveys for the Federal Government and the District of Columbia. This work constantly increases each year, and under the head of District work consists of giving lines for alleys and streets for the surface division in connection with improvements of the same; surveys for schools and engine houses; locating encroachments upon public space; surveys in connection with complaints of various kinds; surveys made in the preparation of condemna-

tion cases for streets, alleys, and parks; surveys for the assessor's office to determine the position of houses with respect to lots; and any other surveys that may be required for official use upon the request of public officials.

Much work has also been performed for the Federal Government. Under this head may be mentioned the survey of the Anacostia River flats. An entire field party has been engaged in determining property lines, the high-water line, and the 10-foot contour line along the Anacostia River and furnishing descriptions for the United States Engineer's office in connection with the reclamation of these flats by the Federal Government.

Effort was made to have the highway plan amended in connection with this work so that the same would harmonize with a proposed amended taking line, and Congress was petitioned to amend the law so that the taking line would follow the proposed highway plan instead of following approximately the 10-foot contour line, as now provided by law, both of which have been unsuccessful, but effort will be renewed to accomplish these results. In this connection a very elaborate and comprehensive survey was made.

The following table is submitted as a matter of comparison and convenience. It will show the relation of the work for the past year with that of the previous year.

	Fiscal year, 1914-15.	Fiscal year, 1915-16.
FOR PRIVATE PARTIES.		
Individual lots or parts of lots surveyed in city and county.....	1,561	2,160
Certificates of survey issued covering one or more lots.....	959	1,014
Duplicates of above recorded in survey certificate books.....	959	1,014
Separate surveys made to verify walls.....	803	941
Postal-card reports concerning walls to owners.....	803	941
Individual buildings inspected as to location of new walls.....	1,535	1,741
Large tracts in county surveyed, subdivided, and recorded.....	9	11
Outline surveys in county of unsubdivided tracts.....	20	21
Subdivision plats prepared in duplicate.....	299	360
Duplicate subdivisions prepared for assessor.....	299	360
Subdivisions recorded.....	293	356
Total of individual new lots in subdivisions.....	1,904	2,039
Plats of one or more recorded lots to accompany applications for building permits (commonly called "building plats"), in duplicate.....	1,029	1,191
Plats made under regulations for theaters, stables, motors, etc.....	193	297
Estimates of cost issued in triplicate.....	3,017	3,756
Plats made up on orders of private parties.....	2,509	2,894
Total of fees paid to collector of taxes by private parties.....	\$12,817.95	\$15,005.15
FOR THE DISTRICT OF COLUMBIA.		
Surveys for the District of Columbia.....	121	129
Plats recorded (condemnations, dedications, etc.).....	67	61
Reports concerning walls to building inspector.....	793	916
Assessment and taxation plats recorded.....	254	218
MISCELLANEOUS.		
Total of surveys for the District of Columbia and private parties.....	1,912	2,116
Total of plats, public and private, including plats drawn in books.....	4,643	5,182

STREET EXTENSION (STREET AND ALLEY CONDEMNATIONS).

Attached to this report is report of the assistant surveyor relating to matters of street, alley, and park condemnations.

As stated, 24 cases have been prepared and filed, against 18 cases for the previous year. Twenty-eight street and park condemnation cases were before the courts and 15 alley cases. A table herewith appended will show the status of each case.

This class of work must be done with great care and accuracy, as frequently very large amounts are involved. The work consists of (1) survey of the property to be acquired; (2) preparation of plats and descriptions of land to be taken; (3) furnishing the ownership and descriptions of the property benefited; (4) a man constantly in attendance before the jury and court; (5) examination of the verdict and the recommendation to the commissioners.

The office has several condemnation matters uncompleted, and will forward them as soon as completed for the consideration of the commissioners. Perhaps the most important cases now being considered are: (1) Widening of Benning Road; (2) widening of Georgia Avenue; (3) widening Wisconsin Avenue; (4) widening Cathedral Avenue and Woodley Road; (5) Thirteenth Street between Spring Road and Colorado Avenue; and (6) extension of Calvert Street and Cleveland Avenue.

SURVEYS OF OLD SUBDIVISIONS.

An appropriation of \$2,500 was provided in the last appropriation act for surveys to mark more definitely on the ground old subdivisions, principally those prior to the law of 1888 regulating subdivisions. This appropriation, much to the detriment of this work, has been discontinued. It was hoped that this work might be carried on until all of the old subdivisions were defined upon the ground by permanent monuments.

In connection with this work the following surveys have been made: Survey of all property between A and Military Roads; parcel 202/1, etc.; western addition to Georgetown; property on the Naylor Road between Good Hope and the District line; Porter Street, Connecticut Avenue, and Varnum Street; marking out many property lines along the Anacostia River; squares 5773, 1212, 2515, 5782, and 2079.

Monuments have been planted and survey plats drawn for these various surveys.

PARKS.

Seventy-five thousand dollars has been appropriated in three acts for the acquisition of small parks, surrounded by streets, outside the limits of the original city. These selections were to be made in accordance with map on file in this office. All of the available parcels have been condemned, or are in process of condemnation, and considerable money will be unexpended because of the lack of suitable parcels.

I do not believe the commissioners should be restricted in their selections of these parcels, as required by law, but should be left free to select those that are most desirable. Conditions change so rapidly that frequently buildings are erected upon these parcels, rendering their acquisition prohibitory. These small parks add much to the attractiveness of the city, and this appropriation should be continued. I have already submitted a table of those thought desirable to be acquired, but many of them could not be acquired if the present law is not amended. It is strongly recommended that the commissioners take the necessary steps to have this done.

Piney Branch Parkway.—This parkway extends at present from Rock Creek Park to Sixteenth Street, with a width of approximately 400 feet, but ends abruptly at the west side of Sixteenth Street. This should be continued up this valley to the Municipal Hospital, and if accomplished would make a connection from Municipal Hospital by way of Piney Branch to Sixteenth Street and the Zoological Park, and, as now provided by new legislation, along Rock Creek to Potomac Park.

This land has much natural beauty, which renders it especially attractive for a park. It is now, however, becoming a dump, and it is only a question of time when many of the stately oaks will be destroyed and a menace to health created; besides, there is apt to be a fill along the east line of Sixteenth Street, destroying the effect of the Sixteenth Street Bridge, as well as closing the outlet to Piney Branch Parkway west of Sixteenth Street. This valley can not be filled by the ordinary dumping, due to the growth of this section, for many years, and during all this time it would seriously retard development in this section, besides being a blot to the landscape.

BARRY FARM.

It is recommended that the commissioners secure legislation providing for the widening by condemnation of all the existing rights of way in Barry Farm. These rights of way are privately owned and have so existed since 1867. This community has long since been neglected, and something should be done to relieve this very unsatisfactory and unhealthy condition.

OLD ABANDONED COUNTY ROADS.

It is also recommended that the commissioners secure legislation authorizing the abandonment of old county roads when they become useless and unnecessary by reason of the dedication or condemnation of streets in accordance with the highway plan. These old roads frequently become a hindrance to development and a nuisance to the public, and the commissioners should be relieved of any responsibility for their maintenance.

SURVEYS TO MARK PERMANENT SYSTEM OF HIGHWAYS PLAN.

Two thousand dollars was asked for in the estimates to provide for a survey to mark permanently upon the ground the permanent system of highways, which plan was made in accordance with law approved March 2, 1893, and amended June 28, 1898.

tion cases for streets, alleys, and parks; surveys for the assessor's office to determine the position of houses with respect to lots; and any other surveys that may be required for official use upon the request of public officials.

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PARKS.

Seventy-five thousand dollars has been appropriated in three acts for the acquisition of small parks, surrounded by streets, outside the limits of the original city. These selections were to be made in accordance with map on file in this office. All of the available parcels have been condemned, or are in process of condemnation, and considerable money will be unexpended because of the lack of suitable parcels.

I do not believe the commissioners should be restricted in their selections of these parcels, as required by law, but should be left free to select those that are most desirable. Conditions change so rapidly that frequently buildings are erected upon these parcels, rendering their acquisition prohibitory. These small parks add much to the attractiveness of the city, and this appropriation should be continued. I have already submitted a table of those thought desirable to be acquired, but many of them could not be acquired if the present law is not amended. It is strongly recommended that the commissioners take the necessary steps to have this done.

Piney Branch Parkway.—This parkway extends at present from Rock Creek Park to Sixteenth Street, with a width of approximately 400 feet, but ends abruptly at the west side of Sixteenth Street. This should be continued up this valley to the Municipal Hospital, and if accomplished would make a connection from Municipal Hospital by way of Piney Branch to Sixteenth Street and the Zoological Park, and, as now provided by new legislation, along Rock Creek to Potomac Park.

This land has much natural beauty, which renders it especially attractive for a park. It is now, however, becoming a dump, and it is only a question of time when many of the stately oaks will be destroyed and a menace to health created; besides, there is apt to be a fill along the east line of Sixteenth Street, destroying the effect of the Sixteenth Street Bridge, as well as closing the outlet to Piney Branch Parkway west of Sixteenth Street. This valley can not be filled by the ordinary dumping, due to the growth of this section, for many years, and during all this time it would seriously retard development in this section, besides being a blot to the landscape.

BARRY FARM.

It is recommended that the commissioners secure legislation providing for the widening by condemnation of all the existing rights of way in Barry Farm. These rights of way are privately owned and have so existed since 1867. This community has long since been neglected, and something should be done to relieve this very unsatisfactory and unhealthy condition.

OLD ABANDONED COUNTY ROADS.

It is also recommended that the commissioners secure legislation authorizing the abandonment of old county roads when they become useless and unnecessary by reason of the dedication or condemnation of streets in accordance with the highway plan. These old roads frequently become a hindrance to development and a nuisance to the public, and the commissioners should be relieved of any responsibility for their maintenance.

SURVEYS TO MARK PERMANENT SYSTEM OF HIGHWAYS PLAN.

Two thousand dollars was asked for in the estimates to provide for a survey to mark permanently upon the ground the permanent system of highways, which plan was made in accordance with law approved March 2, 1893, and amended June 28, 1898.

This would facilitate the subdividing of land into lots, blocks, etc., as well as assisting greatly in the preparation of all condemnation cases for streets and the conveyance of land by deed, as it is often found necessary to determine the street lines to be used for references in deeds. Frequently landowners also desire to have street lines determined so as to make improvements, such as fences, buildings, etc., in accordance with street lines. At present this plan is principally a paper plan, and is not marked definitely upon the ground, and it will be seen that this survey would be of inestimable value.

ASSESSMENTS FOR BENEFITS IN CONNECTION WITH STREETS, ALLEYS, ETC.

In connection with the condemnation of streets and alleys the law provides that the entire cost shall be assessed upon the property benefited. This many times works a very great hardship upon property owners, as in many instances they do not receive the full benefits until the street is improved. There is no denying the fact that the paper opening of streets is a benefit. This is shown by the fact that land is subdivided and about 33 per cent of it given away for streets and alleys, the remaining part being increased in value enough and more to offset the dedication. It would seem, however, that a more equitable plan would be to suspend the collection of benefits in condemnation cases until the streets were graded, regulated, or otherwise improved for travel, similar to the law regarding water-main assessments. Water mains are constructed, but the assessments are not collectible until the property through which they pass is subdivided.

Klingle Road Valley.—Klingle Road Valley should also be acquired from the Zoological Park just east of Connecticut Avenue, following the valley westerly until it connects with the park system running northerly just east of the Naval Observatory. Much agitation was had concerning this project during the last session of Congress. Strong influence is back of this project, and I believe if the commissioners would recommend it there would be strong likelihood of securing this much desired park. Certainly the real-estate interests have postponed the development of property along this valley, hoping that some definite plan would be adopted for its acquisition and its development. All interests, I believe, are favorable to this scheme, and it would therefore seem only fair that some definite action should be taken. There are few places in the District with a more beautiful growth of forest trees and more pleasing to the most esthetic than this beautiful valley.

Fort Davis and Fort Dupont, and Alabama Avenue connecting the same.—The condemnation proceedings covering this matter have just been completed and the awards paid. This transfers title to these two historic forts to the Government. There are many others, forming a chain of forts around the city of Washington which were constructed during the Civil War as a defense against any invasion of the Capital. One of these (Fort Stevens) became of special interest on account of an engagement, but they are all of historic interest and should be preserved, with a connecting boulevard between each. They form a ring around the city, and situated as they are on high ground, would offer a magnificent view of the city, the rivers, and Alexandria in the distance. They are fast being destroyed by improvements which are pressing toward the suburbs, but before they are destroyed action should be taken to acquire them by condemnation, and I would recommend that a small appropriation be made to have a survey and estimates made or the cost of acquiring these sites.

I am, however, strongly opposed to the idea of deferring the condemnation of streets until there is an appropriation for their physical improvement. This would seriously embarrass the commissioners in carrying out the highway plan in an orderly manner. Frequently it is in the interest of economy and the public to open a street in advance of the necessity of its physical improvement. The jury should not be required, as is now provided, to find the entire cost as benefits. Many streets are of a general character, through arteries of travel, and to require the owners of property in the immediate vicinity to pay the entire cost would be an unreasonable burden, amounting almost to confiscation. There are already many streets which can not be opened under the present law, but will of necessity have to await an appropriation from Congress.

Very respectfully,

MELVIN C. HAZEN,
Surveyor, District of Columbia.

Capt. J. J. LOVING,
Corps of Engineers, United States Army,
Assistant to Engineer Commissioner,
District of Columbia.

STREET EXTENSION DIVISION.

WASHINGTON, *October 3, 1916.*

SIR: I have the honor to submit herewith report on the operation of the street extension division for the fiscal year ended June 30, 1916.

During the year 24 street, alley, and park condemnation cases were prepared and filed. The most important of these cases and those requiring extensive surveys are Thirteenth Street between Spring Road and Colorado Avenue, Perry Place and Spring Place, 11 small park sites filed as one case, Wisconsin Avenue between Garfield Street and the District line, Naylor Road between Good Hope and the District line, and Calvert Street and Cleveland Avenue. None of these cases, with the exception of Perry Place and Spring Place, has been finally disposed of, but it is expected that they will be completed this fall.

The condemnation of the Anacostia River flats has been delayed pending a change in the highway plan and authority from Congress to condemn in accordance with the changed plan.

Submitted herewith is a table showing action on all condemnation cases filed during the year, and action on cases previously filed where such cases were not finally disposed of prior to July 1, 1915.

Very respectfully,

J. B. SHINN,
Assistant Surveyor, District of Columbia.

The SURVEYOR.

Condemnation cases.

STREET EXTENSIONS AND PARKS.

Location.	Court docket No.	Act No.	Act approved	Case filed.	Verdict filed.	Verdict.		Remarks.
						Damages.	Benefits.	
Road and park along Anacostia River.....	1049	170	May 10, 1910	Nov. 27, 1912	.....	.....	.....	Proceedings held in abeyance pending decision in equity suit to settle title to filled land along river. Indefinitely continued.
Establishment of building-restriction line south side Park Road, north side Kenyon Street, both between Thirteenth and Fourteenth Streets.	1050	.....	.....	.....	.....	.....	.....	Verdict confirmed in part July 31, 1914.
Highway and park along Anacostia River, parcels 210, 211, 217, 218, 221.	1078	435	Mar. 4, 1913	Nov. 8, 1914	June 19, 1914	.....	.....	Case dismissed as to squares 2594, 2841, and 3353. Verdict confirmed May 22, 1916, as to other squares.
Parks, squares 2590, 2594, west of 2675, 2841, 3099, 3353, 3532, 5407.	1098	435	.....	Apr. 1, 1914	Apr. 25, 1916	\$20,350.00	\$10,750.07	Verdict confirmed May 28, 1915.
Madison Street from Fourteenth Street to Colorado Avenue.	1099	.....	.....	.....	Oct. 5, 1914	5,239.88	5,714.88	Awaiting recording of change in highway plan; new case to be filed.
Widening Benning Road west of Anacostia River.....	1107	.....	.....	Apr. 21, 1914	.....	.....	.....	Hearing concluded and case given to jury Mar. 7, 1916.
Widening Georgia Avenue.....	1110	.....	.....	June 30, 1914	.....	.....	.....	Case confirmed in part Mar. 13, 1915.
Square 5563 for highway and park purposes.....	1121	.....	.....	Sept. 22, 1914	Feb. 4, 1915	.....	.....	Hearing concluded and case given to jury June 26, 1916.
Extension of Girard Street, square 2669.....	1122	.....	.....	Oct. 9, 1914	.....	.....	.....	Verdict confirmed Dec. 10, 1915.
Widening Meigs Place, Sixteenth Street to Bladensburg Road.	1124	.....	.....	Oct. 12, 1914	May 3, 1915	1,116.00	1,402.79	Verdict confirmed Jan. 8, 1916.
Widening Columbia Road abutting square 2669.....	1134	.....	.....	Feb. 13, 1915	Nov. 26, 1915	2,458.40	2,725.20	Dismissed by District Court Jan. 13, 1916; new case filed.
Widening Benning Road east of Anacostia River.....	1138	.....	.....	Feb. 27, 1915	.....	.....	.....	Verdict confirmed Dec. 15, 1915.
Hamlin and Twenty-fourth Streets NE.	1139	.....	.....	.....	Nov. 16, 1915	4,311.91	4,677.50	Proceeding temporarily suspended March, 1916.
Cathedral Avenue and Woodley Road.....	1239	.....	.....	Apr. 20, 1915	.....	.....	.....	Verdict confirmed Aug. 4, 1915.
Building line, Euclid Street, square 2594.....	1240	.....	.....	.....	June 25, 1915	3,864.60	4,135.40	Verdict confirmed May 27, 1916.
Widening Minnesota Avenue, Benning Road to Gault Place.	1242	.....	.....	May 17, 1915	Apr. 25, 1916	1,344.00	1,895.82	Verdict not confirmed; objections filed.
Central Avenue between Rhode Island Avenue and Trentwood Road.	1247	.....	.....	Aug. 6, 1915	Mar. 30, 1916	4,525.96	5,048.76	Hearing concluded and case given to jury Mar. 20, 1916.
Thirteenth Street, between Spring Road and Colorado Avenue and adjacent streets.	1249	.....	.....	Aug. 16, 1915	Apr. 10, 1916	6,073.76	7,029.30	Verdict confirmed May 12, 1916.
Perry Place and Spring Place.	1250	.....	.....	.....	.....	3,662.37	4,164.57	Verdict confirmed May 11, 1916.
Fourth, Fifteenth, and Franklin Streets NE.....	1251	.....	.....	.....	.....	.....	.....

Court docket No.	Location.	Case filed.	Verdict filed.	Verdict.		Remarks.
				Damages.	Benefits.	
1257	Parks, squares 5574, 5575, west of 2623, 3003, 2024, 2027, 1725, 1833, 1834, 5551, 4247.			Nov. 11, 1915	June 20, 1916	Verdict not yet confirmed.
1260	Widening Treming Road east of Anacostia River.			Dec. 17, 1915	May 17, 1916	Do.
1263	Wisconsin Avenue between Garfield Street and District of Columbia line.			Feb. 4, 1916		Continued to Oct. 4, 1916.
1266	Naylor Road between Good Hope and District of Columbia line.			Feb. 28, 1916	June 29, 1916	Not yet confirmed.
1267	Calvert Street and Cleveland Avenue.			do.		Continued to July 6, 1916.
1268	Porter Street, squares 3515 and 3516.			do.		Continued to Oct. 3, 1916.
1269	First Street N.E. between Florida Avenue and Q Street.			do.		Do.
1277	V Street N.W. between Flagler Place and Second Street. Building-restriction line. Park Road and Mount Pleasant Streets, square 2612.			May 9, 1916		Continued to Oct. 4, 1916.
ALLEYS.						
1113	Square 502.	June 30, 1914	Jan. 6, 1915	\$1,079.86	\$1,171.51	Case failed for reason that jury failed to find benefits equal to damages and costs.
1123	Square 222.	Oct. 12, 1914				Discontinued under agreement by property owner to dedicate alley.
1130	Square 2850.	Nov. 4, 1914	June 30, 1915	1,480.32	1,804.48	Verdict confirmed Aug. 4, 1915.
1137	Square 864.	Feb. 19, 1915	July 1, 1915	316.00	600.80	Do.
1248	Square 3131.	Aug. 16, 1915	Dec. 10, 1915	452.87	717.77	Verdict confirmed Jan. 29, 1916.
1252	Square 2877.	Sept. 24, 1915	Mar. 30, 1916	1,898.75	2,065.00	Not yet confirmed.
1252	Square 3005.	do.	do.	2,689.00	2,832.50	Do.
1252	Square 2540.	do.	do.	3,541.75	3,725.00	Do.
1252	Square 2875.	do.	do.	3,021.00	3,191.00	Do.
1256	Square 2621.	Nov. 11, 1915				Commissioners ordered case dismissed Jan. 26, 1916.
1261	Square 2662.	Jan. 28, 1916				Pending.
1261	Square 3045.	do.				Do.
1261	Square 3114.	do.				Do.
1262	Square 1033.	do.				Do.
1262	Square 1053.	do.				Do.

REPORT OF THE SUPERINTENDENT OF TREES AND PARKINGS.

WASHINGTON, D. C., August 21, 1916.

SIR: I have the honor to submit my thirty-first annual report dealing with the operations of the trees and parkings office for the fiscal year ended June 30, 1916.

TREES PLANTED, REMOVED, AND SPRAYED.

The planting of young trees to their permanent positions on the streets again continued to be the most important feature of our work. A total of 3,421 young trees were planted during the year—an increase of 33 over last year's record. Of the number planted 3,344 were set at the curb line, 66 in the parking between the inner edge of the sidewalk and the building line. In addition, 3 were planted in school grounds; 1 in central parking of Fourteenth Street NW., between Kennedy and Longfellow Streets; 2 in central parking of Fourteenth Street NW., north of Montague Street; 2 in the grounds of the Anacostia pumping station; and 3 in the triangle at the intersection of Thirteenth Street, New York Avenue, and H Street NW.

During the year 2,096 trees were removed for various reasons. There was a decrease of 532 trees from the number removed the previous year. Many of the trees removed during the early part of the fiscal year have been replaced.

Attention is called to the fact that the old silver maple trees were removed from both sides of Maryland Avenue NE., between Eighth and Twelfth Streets, and replaced with red oaks. The remaining silver maples on this street between the Capitol and Eighth Street should be removed and replaced with red oaks. This treatment would greatly improve the appearance of this important street and give visitors a good impression of the city's trees, as this is one of the leading thoroughfares into this city. Tulip poplars were also removed from North Capitol Street, between N and T Streets, and replaced with pin oaks, to conform with the young trees on this street south of M Street. The Carolina poplars were removed from Fifth Street NW., between P Street and Florida Avenue, and replaced with pin oaks. This eliminates this variety of tree from this street.

Spraying operations were started at the beginning of the fiscal year and continued during the month of July, the insects having ceased their depredations about this time. No spraying was again undertaken until May last, when insects appeared in large numbers in widely scattered localities.

The following statement shows the number and varieties of trees planted, removed, and sprayed during the year:

Variety.	Planted.	Removed.	Sprayed.
Acacia.....		4	
Ailanthus.....		4	
Althea.....		1	
Apple.....		1	
Ash.....		8	244
Catalpa.....		5	
Cedar.....		16	
Chestnut.....		1	
Cherry.....		2	
Cherry, wild.....		3	
Chestnut, horse.....	7	1	148
Dogwood.....		1	
Elm.....		1	
Ginkgo.....	323	40	12,933
Gum.....	153	30	
Black.....		1	
Sweet.....		1	
Hickory.....		2	
Linden.....		2	
Locust.....	68	68	10,821
Honey.....		5	
Yellow.....		18	5
Magnolia.....		1	
Maple.....			
Norway.....	957	304	4,933
Red.....		86	303
Silver.....	24	440	6,128
Sugar.....	201	90	1,211
Sycamore.....		6	10
Mulberry.....		19	
Negundo.....		13	186

Variety.	Planted.	Removed.	Sprayed.
Oak:			
Pin.....	978	76	552
Red.....	164	45	330
Spanish.....		1	
Swamp white.....		3	
White.....		8	
Willow leaf.....	9	1	
Osage orange.....		2	
Peach.....		1	
Pear.....		1	
Poplar:			
Athenian.....		3	
Aspen.....		14	
Carolina.....		335	
Tulip.....	2	92	
Sycamore.....	535	339	2,214
Walnut, black.....		1	
Willow.....		2	
Willow, laurel leaf.....		1	
Mixed varieties.....			3,647
Total.....	3,421	2,096	43,665

The planting, removal, and spraying of the above trees was paid for as designated below:

	Streets, District of Columbia, 1915-16, parking commis- sion.	Streets, District of Columbia, 1916, parking commis- sion.	Appropria- tions for other depart- ments.	Whole cost, deposits.
Planting.....		3,179	187	55
Removals.....	105	1,480	472	39
Spraying.....	14,070	29,595		

Of the 2,096 trees removed during the year, 984 were dead, decayed, and dangerous: 402 were of inferior and condemned varieties; 21 to relieve excessive shade; 452 because of street improvements, driveways, vaults, buildings, etc.; 8 because of improvement of parkings; 7, improvements of alleys; 152, accidents and storms; 2 to accommodate lamps; 13, injurious to curb trees; 20, injurious to private property; 5 to relieve telephone and electric wires along suburban roadways; 30 to accommodate the construction of tunnel for the central heating, lighting, and power plant, D Street NW., between Twelfth and Fifteenth Streets.

It was ascertained that 67 trees were destroyed by illuminating gas, 61 by drought, 4 by salt water, 29 by abnormal moist supply, 31 by mutilation of the roots, 7 by being girdled, 7 by being filled around, 3 by fire, 1 by the binding of the roots by the curb, and the remaining were unexplained.

One thousand eight hundred and fifty-six trees of the number removed stood at the curb line, 163 in the parkings, 37 in the sidewalk, 8 in school grounds, 19 in roadways, 11 in alleys, and 2 in the grounds of the Anacostia pumping station.

NURSERIES.

The nurseries are well stocked with trees of all varieties considered best for street planting. No trees were planted in the nursery rows at the Georgia Avenue nursery during the year, this work being confined to the E Street nursery, in the Washington Asylum Grounds. It is very necessary that the nursery should be well stocked at all times.

The total number of seedlings planted was 1,447, and of this number 340 were sugar maples, 364 were pin oaks, and 743 were willow leaf oaks.

TRIMMING.

It has been impossible to undertake any general trimming of trees during the fiscal year without neglecting other important work. A great many individual requests

for the trimming of trees were received during the year and they were given attention promptly. At the close of the year this work was practically up to date. Most of the trees throughout the city are in need of some attention, especially the soft maples, whose dead branches render them unsightly and a menace to the public. A total of 10,119 trees were trimmed.

TREE SURGERY.

During the year the cavities in 110 trees were cemented. This treatment, it is thought, will prolong their life. There are many of the city's best trees now on the streets which need similar treatment, but it is impossible to give them attention without neglecting other important work. The following shows the location, kind, and number of trees cemented:

Kind.	Curb.	Parking.
Elm.....	5	.....
Linden.....	58	26
Maple.....	.....	.....
Norway.....	3	.....
Sycamore.....	15	.....
Poplar, tulip.....	.....	1
Sycamore.....	2	.....
Total.....	83	27

CULTIVATING YOUNG TREES AND MOWING PARKINGS.

It is necessary to cultivate all young trees to insure good growths; especially is this true in the case of all recently planted trees. The trees planted during the fall and spring planting seasons of past fiscal year have had the dirt lowered around them and ground loosened. This treatment allows the young trees to derive the benefit from all rain. Trees that have been planted from two to three years have to be cultivated. In connection with this work it is realized that the good looks of the street are injured by the overgrowth of weeds in the tree spaces and parkings. Many complaints are received each year for the mowing of weeds from persons considering them a menace to health. Attention was given to the maintenance and mowing of grass in front of the District Building, Center Market, Ashmead Place, the public-convenience station at Seventh and Pennsylvania Avenue, the parking around Washington Circle, the park at Seventh Street and Louisiana Avenue, the slope at Twenty-second and Decatur Streets NW., the triangle at the intersection of Fourteenth Street and Colorado Avenue, the Quarry Road entrance to the Zoo Park, east approach to the Q Street Bridge, and the triangle at the intersection of Twentieth and R Streets and Connecticut Avenue NW.

At the close of the fiscal year the work of cultivating trees and mowing weeds had not been completed.

TREE BOXES REMOVED.

One thousand two hundred and one old tree boxes were removed during the year from trees which no longer required their protection.

REGULATION OF TERRACES.

This office examined and issued 768 permits affecting terraces with the view of bringing about uniform conditions. During the year about one-half dozen persons violated their permits, and in most of the cases the offenders were required to change the parking according to the permit issued by this office. Exceptions were made in a few cases because ununiform conditions already existed on the street and the terraces were allowed to remain.

PAVING OF ABANDONED TREE SPACES.

There are many abandoned tree spaces throughout the city, and it is found necessary from time to time to fill the same to grade of sidewalk. This office realizing the danger of these spaces, an unusual effort is made during the year to have as many as possible paved. This work was performed by the surface division and the cost of the work paid from the appropriation for the parking commission. A total of \$978.17 was spent on this work.

SUMMARY.

Trees in streets, parkings, sidewalks, playgrounds, and school yards at the close of the fiscal year 1915.....	103, 135
Trees planted during the fiscal year 1916.....	3, 421
Trees removed during the fiscal year 1916.....	2, 066

Net increase during 1916..... 1, 355

Trees in streets, parkings, sidewalks, playgrounds, and school yards at the close of the fiscal year 1916.....	104, 490
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NOTE.—In addition to the number removed above 30 were removed from alleys and roadways, but did not diminish the number included in the official count.

Curb trees on streets at close of fiscal year 1915.....	102, 818
Net increase of curb trees during the fiscal year 1916.....	1, 488

Curb trees on streets at close of fiscal year 1916..... 104, 306

Mileage of trees at close of fiscal year 1915.....	584. 18
Increase of mileage of trees, fiscal year 1916.....	8. 46

Mileage of trees at close of fiscal year 1916..... 592. 64

Mileage of tree-planted streets at close of fiscal year 1915.....	292. 09
Increase of mileage of tree-planted streets at close of fiscal year 1916.....	4. 23

Mileage of tree-planted streets at close of fiscal year 1916..... 296. 32

NOTE.—Mileage is figured on basis of 352 trees to the mile.

Expenditures.

	Labor.		Material.	
	1915-16	1916	1915-16	1916
Planting.....	\$18. 00	\$8, 398. 31		\$2, 937. 42
Removing dead, decayed, and dangerous trees.....	221. 75	3, 347. 81		
Trimming.....	492. 50	2, 568. 86		
Cultivating young trees.....	349. 75	1, 530. 89		
Improvement, care, and mowing of parkings.....	144. 38	2, 190. 91		100. 16
Extermination of insects.....	284. 25	725. 85	\$89. 52	861. 16
Clerical hire.....		2, 026. 75		
Maintenance of yard.....	85. 75	1, 147. 00		
Maintenance of nursery and shops.....	116. 25	4, 353. 66		
Miscellaneous repairs to boxes, etc.....	114. 75	1, 570. 05		
Tree surgery.....		259. 06		
Storm damage.....		822. 82		
Labor Day payments to laborers.....		114. 25		
Removing wooden tree boxes and iron guards.....	48. 50	182. 50		
Filling low tree spaces.....		359. 24		
Supervision and inspection.....	27. 00	1, 188. 81	5. 00	5. 00
General repairs, sharpening tools, shoeing horses, wheelwright work, stable and blacksmith supplies.....		608. 06	125. 28	222. 76
Fuel.....				38. 27
Forage.....			281. 06	2, 609. 01
Lumber, miscellaneous.....				20. 10
Paints, oils, glass, putty, etc.....				49. 21
Rope, cord, and twine.....				66. 18
Tools and agricultural implements.....				104. 20
Hose, rubber.....				45. 00
Stationery, printing, office supplies, manifolded machines, and forms for property returns.....				210. 38
Harness.....				183. 80
Wagons and running gears for tool boxes.....				275. 00
Electrical supplies.....				73. 95
Trees, arbor vite.....				121. 50
Sundries.....			1. 38	6. 87
Miscellaneous work performed by this department, reimbursement being secured by repayments from other appropriations and deposits.....	8. 75	2, 872. 47		
Total.....	1, 911. 63	34, 267. 30	482. 44	7, 929. 97

Charges against appropriations.

	1915-16	1916
Soil accounts.....	\$95.10	\$128.70
Paving tree spaces.....	56.98	921.19
Electric current.....		48.90
Building 3 tool-box wagon bodies.....		252.40
Traveling expenses (authorized).....		12.58
Building 1 stone wagon.....		220.00
Making "Street closed" signs.....		8.25
Repairs to cuts.....		5.87
Photographing low tree spaces.....		3.80
Trimming shrubbery on lawn of Municipal Building.....		2.20
Repairing curtain of roll-top desk.....		1.59
Repairs to service pipe.....		1.20
Proportionate part of the compensation of E. S. Dawson.....		60.00
Total.....	152.08	1,666.68

By appropriation "Streets, District of Columbia, 1916, Parking Commission".....	\$40,000.00
By repayment to above appropriation.....	3,879.63

Total..... 43,879.63

Labor.....	34,267.30
Materials.....	7,929.97
Charges against appropriation.....	1,666.68
To balance of above appropriation, unexpended.....	15.68

Total..... 43,879.63

By the unexpended balance of the \$5,000 made immediately available by act of Congress of the preceding year and carried as appropriation "Streets, District of Columbia, 1915-16, Parking Commission".....

By repayment to said appropriation.....

Total..... 2,540.71

Labor.....	1,911.63
Materials.....	482.44
Charge against the appropriation.....	152.08
To balance of above appropriation, unexpended.....	6.26

Total..... 2,552.41

Expenditures from miscellaneous appropriations, exclusive of Parking Commission.

Appropriation.	Through repayment.	
	1915-16	1916
Care and maintenance of public-convenience stations, District of Columbia, 1916.....		\$11.30
Construction of Q Street Bridge across Rock Creek, D. C.....		664.55
Construction of suburban streets and suburban roads.....		4.54
Improvements and repairs, District of Columbia, 1916:		
Assessment and permit work.....		955.05
Grading of streets, alleys, and roads.....		60.65
Nichols Avenue and south approach of Navy Yard Bridge.....		235.40
Northeast schedule.....		13.53
Repairs to streets.....		684.01
Repairs to suburban roads.....		27.78
Repave Seventh Street from New York Avenue to Q Street.....		18.03
Repave Tenth Street NW., special.....		6.88
Sidewalks and curbs.....		61.05
Southwest schedule.....		254.58
Electrical department, District of Columbia, 1916 (lighting).....		33.15
Maintenance, etc., playgrounds, District of Columbia, 1916 (maintenance).....		80.03
Maintenance, yards and docks, 1916.....		29.69
Miscellaneous trust-fund deposits.....	\$9.48	304.91
Miscellaneous trust-fund deposit, District of Columbia (D), central heating and power plant, conduits, gas mains, cables, etc.....		107.39
Miscellaneous trust-fund deposit, District of Columbia, Chesapeake & Potomac Telephone Co., general deposit.....		131.59

Expenditures from miscellaneous appropriations, exclusive of Parking Commission—Con.

Appropriation.	Through repayment.	
	1915-16	1916
Miscellaneous trust-fund deposit, District of Columbia, operating account (streets).....		\$107. 75
Miscellaneous trust-fund deposit, District of Columbia, Potomac Electric Power Co. (general account).....		5. 78
Miscellaneous trust-fund deposit, District of Columbia (Potomac Electric Power Co.).....		11. 00
Quartermaster, Marine Corps, Marine Barracks, Washington, D. C.....		17. 07
Water department, District of Columbia, 1916 (high service).....	\$2. 22	53. 92
Total.....	11. 70	3, 879. 63

Sums expended during the year for the purchase and maintenance of horses, carts, and wagons, together with the amounts paid for single and double wagons and 3-horse plow team hire.

[These items included in material list.]

Paid from the appropriation for streets, District of Columbia, 1916, Parking Commission:

Forage, horses, wagons, and miscellaneous equipment and repairs.....	\$3, 240. 61
Single-wagon hire, 461½ days, at \$2.25.....	\$1, 038. 94
Double-wagon hire, 964½ days, at \$4.....	3, 859. 00
Three-horse plow team, 15½ days, at \$6.....	93. 00
Total.....	4, 990. 94
Total.....	8. 231. 55

Paid from appropriation for streets, District of Columbia, 1915-16, Parking Commission:

Forage, horses, wagons, and miscellaneous equipment and repairs....	406. 34
Single-wagon hire, 73½ days, at \$2.25.....	\$165. 38
Double-wagon hire, 75½ days, at \$4.....	303. 00
Total.....	468. 38
Total.....	874. 72

Very respectfully,

T. LANHAM,
Superintendent of Trees and Parkings.

Capt. J. J. LOVING,
*Corps of Engineers, United States Army,
Assistant to the Engineer Commissioner, District of Columbia.*

REPORT OF THE PERMIT CLERK.

WASHINGTON, D. C., *September 11, 1915.*

SIR: I have the honor to submit the annual report of the work of this office, giving the character and number of permits issued during the fiscal year ending June 30, 1916:

PERMITS FOR WHICH FEES WERE PAID.

Water connections.....	1, 593
Repairs.....	734
Sewer connections.....	1, 788
Repairs.....	701
Gas and electric light connections.....	2, 875
Repairs.....	410
Auto tire-inflating apparatus.....	23
Carriage blocks and hitching posts at curb.....	1
Conduits.....	347
Gas mains.....	112
Guard stones.....	9
Manholes, connect with sewer, also enlarge.....	137
Parking fences, erect.....	340
Poles, erect, remove, and replace.....	454
Wagon tags.....	41
Total.....	9, 565

PERMITS ISSUED FOR WHICH NO FEES ARE PAID.

Water, sewer, gas.....	988
Blasting.....	22
Bridges across gutters.....	20
Cables, aerial and overhead connections.....	570
Driveways, lay and repair.....	88
Engines and steam shovels; move through streets.....	104
Parking fences, repair.....	37
Parkings, pave, lay, and repair leads.....	870
Permits, renew and extend.....	85
Roadways; close, grade, and repair.....	79
Sidewalks; grade space; haul across.....	103
Sidewalks; lay and repair.....	121
Sidewalks and roadways; occupy temporarily and for business.....	26
Steam and electric railways.....	24
Steps in parking; build and repair.....	460
Stop-cock boxes; regulate.....	48
Trees, trim or remove.....	18
United States Government.....	13
Walls; build or repair retaining.....	106
Water tables; lay and repair.....	350
Wires; string overhead.....	317
Miscellaneous.....	57
Total.....	4,506

Two thousand one hundred and eleven communications were referred to this office. Briefs were made of these on cards, permits issued when necessary, reports made, papers indorsed and returned to the respective divisions having supervision over the inspection of the work for which permits were issued.

Fourteen thousand and seventy-one applications for permits were sorted, arranged according to the location of the work, and filed for ready reference.

A written report was made of all permits for excavations in the public space and forwarded to the engineer of highways.

Very respectfully,

H. M. WOODWARD,
Permit Clerk.

Capt. J. J. LOVING,
Corps of Engineers, United States Army,
Assistant to Engineer Commissioner, District of Columbia.

SUBSURFACE AND BUILDING DIVISION—REPORT OF ASSISTANT IN CHARGE.

WASHINGTON, D. C., September 28, 1916.

COLONEL: I have the honor to forward reports of the subsurface and building division of the engineer department for the fiscal year ended June 30, 1916, as submitted by the superintendent of the water department, the superintendent of sewers, the inspector of buildings, the inspector of plumbing, the municipal architect, and the board for the condemnation of insanitary buildings.

The undersigned is charged with the purchase of land, and also is detailed as the chairman of the board on property accountability which devised the scheme for property keeping in the District. While the system is working smoothly, the board is still considering several changes which will simplify and perfect its operation. Probably the chief benefit derived so far has been to compel all departments to adopt uniform system of property storage and accounting.

The board of examiners for steam engineers and the plumbing board have satisfactorily performed their duties as required by law.

Prices for brick and stone from Occoquan have been fixed by the price board from time to time according to current rates in the District.

Respectfully submitted.

R. G. POWELL,
Captain, Corps of Engineers, United States Army,
Assistant to the Engineer Commissioner District of Columbia.

LIEUT. COL. CHAS. W. KUTZ,
Corps of Engineers, United States Army,
Engineer Commissioner, District of Columbia.

REPORT OF THE SUPERINTENDENT OF THE WATER DEPARTMENT.

WASHINGTON, October 4, 1916.

SIR: I submit the following report of the operations of the water department for the fiscal year ended June 30, 1916.

The department has again exerted every effort to prevent the waste of water, with the result that the per capita consumption has been reduced to 136.5 gallons daily, with a total mean daily consumption of 49,698,000 gallons.

Attention is invited to the following statement of the average daily water consumption (in gallons) at the following locations:

	Washington Navy Yard.	Bureau of Engraving and Printing (new building).	Power Plant.	Government Printing Office. ¹
1915				
July.....	1,805,180	164,230	873,143	1,808,210
August.....	1,567,537	163,012	792,857	2,471,782
September.....	1,310,086	156,530	737,409	2,850,586
October.....	2,112,763	170,117	921,330	2,568,572
November.....	1,735,457	179,690	629,802	2,139,850
December.....	1,414,570	167,124	490,258	2,339,142
1916				
January.....	2,798,690	177,756	531,069	2,446,439
February.....	1,813,408	140,029	523,322	2,568,898
March.....	1,816,247	178,369	536,565	2,309,952
April.....	2,059,650	183,550	541,590	3,351,470
May.....	1,930,470	159,390	572,180	2,476,770
June.....	1,962,160	180,790	628,390	2,637,090
Average.....	1,860,518	168,382	648,159	2,497,402

¹ July 19-20, 1916: 4,570,000 gallons per day, due to breakdown of two small engines, necessitating the running of large engine and condenser, using greater quantity of water.

Statement was made by the superintendent of the Government Printing Office, that there would be no money available this year for cooling tower or other water-saving device, because of the failure of Congress to pass bill appropriating money for "Improvements to power plant." Appropriation for "Repairs to machinery" is not sufficient and "not available" for this work. A total cut in Government Printing Office appropriation of nearly \$500,000 makes any steps in the matter of installing water-saving machinery impossible this year.

The division of water surveys (formerly the pitometer division) engaged in underground survey for leaks, detected and stopped 1,981,000 gallons daily underground leakage.

The continued installation of water meters has also helped reduce unnecessary waste. During the year 5,880 meters were installed at a cost of \$69,617.67, making the total number of meters in use June 30, 1916, 53,983. The percentage of services now metered is 77.5 per cent.

The covering of 75 per cent of Reno Reservoir was accomplished during the year, the cover being of concrete slab construction. The work was done under the supervision of division E.

In connection with the covering of reservoirs will mention at this time that in my estimates for the fiscal year 1918, an appropriation is asked for the covering of one-half of Brightwood Reservoir. Later on, if the the department is successful in securing this appropriation, it will ask for another sum to cover the other half. In this connection will state that it appears absurd to spend so much money for filtering and pumping water into open reservoirs, where same becomes contaminated by dust and germs carried by the wind and rain, which necessitates the losing of large quantities of water during the year and the expenditure of quite a sum of money for cleaning and chemically treating these reservoirs. The necessity for covering these reservoirs seems so apparent that no serious objection can be made against this project.

A financial statement will be found in detail in the report of the division of accounts and stores. From all sources there was available for use during the year \$866,133.22 plus \$1,526.56 for transfer credits not yet received by the auditor. The cash expenditures for the year amounted to \$617,690.45 and the outstanding liabilities, including balance of appropriations not available on June 30, 1916, \$204,831.47, leaving a balance available for appropriation carried forward to 1917 account, \$45,137.86. The total cost for work done during the year as distinguished from cash expenditures (the difference being due to decrease of material in storeroom) was \$658,092.75, of which

42.1 per cent was for new work, 39.7 per cent for operation, 12.7 per cent for general repairs, and 5.5 per cent for replacements.

During the year 54,114 feet, or 10.2 miles, of mains were laid at a cost of \$85,848.02. This brings the total length to mains in the distribution system up to 3,220,487 feet, or 609.9 miles.

The replacing of the large chambers for the water end of the second high-service pump was accomplished without any harm to the pump or to the service. This work, as well as many other projects of importance, was done under the direction of Mr. James T. Fink, the master mechanic.

During the year the National Board of Fire Underwriters visited this city and thoroughly inspected the mains and appurtenances of the department. In this connection attention is invited to their report, No. 275, July, 1916.

At various times during the past year the department has felt the want of pumps, generators, and other mechanical devices ordered and under contract, that, for one cause or another, have not been delivered up to this time.

In every case of delayed delivery it seems that a plausible, if not a convincing, excuse is always at hand for noncompliance with contract. The department would have completed several large projects this year if contracts had been lived up to.

Following are reports in detail of the activities of the several divisions of the department.

The employees of this department have worked honestly and faithfully, and I wish to record my appreciation of the support they have given me.

J. S. GARLAND,

Superintendent Water Department.

Capt. R. G. POWELL,

Corps of Engineers, United States Army,

Assistant Engineer Commissioner, District of Columbia.

ENGINEERING AND CONSTRUCTION.

SIR: I respectfully submit the following report of work done by Division D, engineering and construction, for the fiscal year ended June 30, 1916, and as incorporated in the reports of H. Beckett, assistant engineer, in charge of general engineering; A. S. Lay, chief inspector of valves, in charge of the valve division; S. H. Harding, foreman, in charge of laying mains, etc.; G. von Dachenhausen, foreman in charge of stables; H. Saunders, in charge of greenhouse, flowers, and lawns; and H. C. Fowler, in charge of telephone switchboard.

Three thousand two hundred and thirty-five tons of cast-iron pipe, 96 tons of fire hydrants, 19 tons of miscellaneous cast-iron fittings, 50 tons of pig lead, 6 lengths of steel pipe, 5,703 lengths of terra-cotta pipe, 111½ cubic yards of broken stone, 82 cubic yards of gravel, 193 cubic yards of sand, 410 barrels of cement, and 62,600 bricks were hauled.

Total number of water mains laid, ranging in size from 1½ to 20 inches.....	116
New water mains laid in place of old.....	8
Valves installed, 3 to 20 inches in size.....	565
Valves removed and abandoned.....	190
New valves installed in place of old.....	47
Air valves installed.....	43
Air valves removed.....	4
Valve casings installed.....	557
Valve casings removed.....	154
Buffalo boxes installed.....	26
Buffalo boxes removed.....	48
Valve casings adjusted to grade.....	22
Fire hydrants erected (total number).....	253
Fire hydrants removed.....	183
Erected new fire hydrants in place of old.....	175
Fire hydrants adjusted to grade.....	24

Job 5019: 6 inch joints in water main were repoured and recalked, etc., in Florida Avenue, south side, between Thirteenth and Fourteenth Streets NW.

Job 5031: 6-inch joints in water main were recalked in Church Street between Fifteenth and Sixteenth Streets NW.

Job 5089: Lowered 6-inch main; repoured and recalked joints in E Street, between Ninth and Tenth Streets SW.

Job 5107: 6-inch joints in water main were repoured and recalked, etc., in I Street, between Fourth and Fifth Streets NW.

The above mains were laid prior to 1876, and the joints were evidently badly poured, containing only about 4 to 6 pounds of lead and were constantly leaking. Finding the pipe to be in good condition it was decided to drive back the joints and repour with lead. The old joints gave under the hammer from $\frac{1}{4}$ to 1 inch. Since repouring there have been no leaks.

Job 4830: Changed location of 20-inch main in Nichols Avenue between Waclark and High View Place SE.

Job 4672: Connected 12-inch main with 30-inch in Pennsylvania Avenue between Pennsylvania Avenue Bridge and Prout Street SE.

Job 4671: Made 12-inch connections with 20-inch suction main at the Anacostia pumping station, Eighteenth Street and Minnesota Avenue SE.

Job 4801: Removed and relaid five lengths of 30-inch pipe from the Pennsylvania Avenue Bridge SE., between spans No. 4 and No. 5.

Job 5062: Removed fountain from Reno Reservoir.

Job 4731: Repaired joint of 30-inch main near west abutment of Pennsylvania Avenue Bridge NW.

Number of valves operated.....	8,515
Number of number plates placed in valve casings.....	796
Number of complaints of foul water.....	49
Number of times dividing lines between services were examined.....	6
Number of times dividing lines between services were changed.....	13
Number of fire hydrants examined.....	52,525
Number of fire hydrants repaired.....	1,323
Number of fire hydrants painted.....	2
Number of public hydrants repaired.....	138
Number of public hydrants erected (new locations).....	5
Number of public hydrants erected in place of old.....	18
Number of horse fountains erected.....	1
Number of horse fountains cleaned.....	4,956
Number of sanitary fountains erected (new location).....	4
Number of sanitary fountains repaired.....	23
Number of sanitary fountains cleaned.....	22
Number of lead connections made for stock.....	171
Number of service pipes changed from old to new mains.....	197
Number of service pipes repaired.....	29
Number of intersections located.....	572

Cleaned fountains at Union Station Plaza 11 times during the year.

North basin of Brightwood Reservoir was cleaned twice and sprayed with copper sulphate twice. South basin was cleaned four times and sprayed with copper sulphate twice.

North basin of Reno Reservoir was cleaned twice and sprayed with copper sulphate twice. South basin was cleaned twice.

Samples of water were collected once each week from Brightwood and Reno Reservoirs and delivered to the chemist at the Filtration Plant.

Gatehouse at Reno Reservoir was cleaned 16 times during the year.

East gatehouse at Brightwood Reservoir was cleaned 15 times and west gatehouse was cleaned 21 times during the year.

The two 48-inch mains at the Pennsylvania Avenue Bridge NW., over Rock Creek, were cut off, drained, and their interiors cleaned of all sediment which had collected. These mains were restored to their normal condition after the completion of the work. At the low points of these mains about 3 feet of sediment had collected, in which was mixed a great quantity of decayed lumber, including sizes of 1 by 6 inches, 2 by 4 inches, 6 by 6 inches, and 2 by 12 inches from 6 inches to 16 feet in length. It is not known how this material got into the mains. These mains were installed by the United States Government in 1859.

Five hundred and eleven surveys were made for new mains, connections, fire hydrants, etc.

In Nichols Avenue between High View and Waclark Streets SE., 357 feet of 20-inch pipe was relaid owing to changes in street railway and building lines of Nichols Avenue.

A survey, project, and estimate were made to waterproof roadway at Brightwood Reservoir to prevent surface drainage from seeping into reservoir. This work was taken up owing to a report from the health department showing that the water was

contaminated from animal excrement on this roadway. The project was considered, but, in lieu thereof, it was decided to close the roadway to horse-drawn vehicles. This eliminated the trouble.

Work was begun on 20-inch trunk line main from Georgia Avenue and Fairmont Street to Wisconsin Avenue and Woodley Road NW. This will, when completed, be about 16,000 feet in length; 1,200 feet of this has been laid. The route will be south on Georgia Avenue from Fairmont Street to Euclid Street, west on Euclid Street to Calvert Street, west on Calvert Street to Connecticut Avenue, north on Connecticut Avenue to Cathedral Avenue, west on Cathedral Avenue to Woodley Road, and west on Woodley Road to Wisconsin Avenue NW., where connection will be made with existing 20-inch main in Wisconsin Avenue. This is to take the place of the old 12-inch, 16-inch, and 20-inch mains now in use as one of the trunk lines to Reno Reservoir, 16,750 feet of which is 12-inch pipe. With the new 5,000,000-gallon pump installed and the new main in service, the friction head at the pumping station will be reduced approximately 50 per cent. The old 12-inch line will be used as a reinforcement for the second and third high services, connection being made with service mains where necessary. This will also permit the territory bounded by Cathedral Avenue on the north, Calvert Street on the south, Connecticut Avenue on the east, and Twenty-ninth Street on the west; to be changed from the third to second high service. This change in service, however, can not be made until the new bridge over Rock Creek is completed, allowing the 12-inch to be reconnected across the bridge.

The following items are quoted from the report submitted by Mr. Fowler, in charge of the water department switchboard:

Recorded:

Leaks.....	1,703
Fire alarms.....	744
No water complaints.....	42
Low-pressure complaints.....	7
Telephone connections.....	149,786

All records of leaks and movements of the leakmen are kept by the telephone operators at the department switchboard.

Mr. Saunders, gardener, reports that the following gardening work was done during the year:

Propagated and raised varieties of flowers for flower beds; planted flower beds and window boxes at Bryant Street pumping station; planted privet hedge in front of Bryant street pumping station; kept lawns cut, edged, and watered; trimmed and cultivated shrubbery on slope in rear of stables; cleaned lake and planted water lilies; planted clematis on fence in Second Street; cut, watered, and edged lawns at Reno and Brightwood Reservoirs and at Anacostia pumping station.

Statement of water-main account for the year ended June 30, 1916, showing various sizes and number of feet laid of each size.

	Linear feet.
20-inch.....	1,560
16-inch.....	302
12-inch.....	8,364
Total trunk mains.....	10,226
8-inch.....	38,630
6-inch.....	2,983
4-inch.....	1,450
3-inch.....	825
Total laid.....	54,114 or 10.24 miles.

Total length of water mains in service at the present time, 3,220,487 feet, or 609.94 miles.

During the year 6,083 feet of main of various sizes were abandoned.

The SUPERINTENDENT, WATER DEPARTMENT.

H. BECKETT, Acting Engineer.

PLANS, ESTIMATES, AND TESTS.

SIR: I have the honor to submit the following report of work done by division E, plans, estimates, and tests, for the fiscal year ended June 30, 1916:

Work of the division is divided under two heads, "Tests and experiments," in charge of H. D. Yates, and "Miscellaneous drafting," in charge of C. P. Heins.

Report on the work performed by these subdivisions will be taken up separately and in the order indicated.

The subdivision of "Tests and experiments" is charged with testing and correcting the measuring apparatus used by the department; with making accuracy tests of all water meters used in the District of Columbia; with purifying the oil removed by the waste-cleaning machine; with making special tests of boilers and machinery as called for; with figuring the daily pumpage, consumption, station duty, etc., and with keeping necessary records.

Special tests made include duty trials of pumping engines and electric generating sets; measurements of the amount of water supplied to boilers and apparently evaporated and the quantities of steam actually used for power purposes during a 24-hour period of normal running; and measurements of the steam consumption by several of the steam-using devices for the information of the engineers of the Bureau of Mines, who began a study of the general power plant conditions at the pumping station in November.

Miscellaneous tests include the following: Water meters, $\frac{1}{8}$ to 6 inch sizes, tests for accuracy, 10,677; valves, $\frac{1}{8}$ to 20 inch sizes, tests for leaks, 657; corporation cocks, $\frac{3}{4}$ to $1\frac{1}{2}$ inch sizes, tests for leaks, 1,764; curb cocks, $\frac{3}{4}$ -inch size, tests for leaks, 834; fire hydrants, tests for leaks, 143; and pressure gauges, tested and corrected, 63. Also made durability tests of small-sized water meters; acid and fluid tests of greases; strength tests of paper; tests of V-notch recording meter and recording pressure gauges; tests of automatic measuring tanks; tests of a proportional flow meter; set up recording pressure gauges on fire hydrants; made slip tests on pumps; tested and adjusted pressure regulator valves; repaired clock movements; and overhauled Venturi meters, CO₂ recorder, and other testing and measuring apparatus installed in the pumping station.

All of the 4,400 five-eighths-inch Worthington meters furnished under contract during the year met the guaranteed accuracy requirements.

During the year there were 833 gallons of oil recovered from the material passed by the waste-cleaning machine and rendered fit for use in oil cups.

All of the coal burned at the pumping station during the year was bituminous coal and was purchased on the "ash, moisture, heat unit" basis. Samples were collected from each delivery, which was usually a 300-ton lot, and forwarded to the Bureau of Mines, where all tests were made. The analyses averaged 2.2 per cent moisture "as received" and 17.9 per cent volatile matter, 71.9 per cent fixed carbon, 1.72 per cent sulphur, 10.1 per cent ash, and 14,023 British thermal units per pound, on the "dry coal" basis. The quality of the coal delivered throughout the year was very uniform.

The total pumpage for the year was 8,621,970,000 gallons, which is 252,240,000 gallons less than in 1914-15. The cost of operation was \$49,617.60, as against \$48,950.84 in 1914-15, making the total operative cost of pumping 1,000,000 gallons of water into the mains \$5.75. This cost is approximately 4 per cent more than in 1914-15, and is in part due to an increased proportionate amount of pumping to the second and third high services and in part to the increase in the item of repairs, the other items entering into operative cost showing reductions. The cost of repairs was \$12,187.35, against \$6,271.73 in 1914-15. This item includes the new pump chambers installed on No. 4 pumping engine, costing, exclusive of labor, \$3,072.61, and \$911.41 for repairs to electric units. The cost of coal was \$3.25 per ton, which was 27 cents less than in 1914-15.

The station duty for the year was 67,607,824 foot-pounds per 100 pounds of coal. This is 3.49 per cent less than the duty obtained during the preceding year and represents an annual loss of 195.3 gross tons of coal. This loss is in part due to a less proportionate amount of work done by the high-duty pumps and in part to a slightly lower duty of the pumping engines.

The accompanying tabular statements show the sizes and makes of all private and municipal water meters tested during the year, and the operative cost of pumping.

The normal force employed, in addition to Mr. Yates, consisted of 1 or 2 skilled laborers, 1 draftsman, 1 plumber, and 1 helper.

Cost of operating pumping engines at the District pumping station during the year ended June 30, 1916.

Operating expenses:

Salaries—1 chief steam engineer, at \$1,750 per annum; 3 steam engineers, at \$1,100; 3 assistant steam engineers, at \$875; 3 firemen, at \$875; and 4 oilers, at \$610 (less deductions on account of leave).....	\$10,180.13	
Miscellaneous per diem labor—substitute engineers, substitute firemen, boiler cleaners, steam fitter, electrician, helpers, and laborers.....	7,296.33	\$17,476.46
Coal, 12,498.156 pounds bituminous coal, at \$3.25 per ton (corrected for deductions on account of British thermal units and excess ash).....	18,122.69	
20 tons of bituminous coal, at \$3.95 per ton.....	79.00	
Supplies, oils, greases, etc.....		18,201.69
Repairs to pumps, engines, boilers, etc.—		1,752.10
Per diem labor.....	5,838.19	
Material expended.....	6,349.16	
		12,187.35

Total cost of operation.....

Total pumpage for the year, without allowance for slip.....	gallons..	8,621,970,000
Greatest amount pumped in 1 day (Oct. 4).....	do....	24,439,100
Least amount pumped in 1 day (May 6).....	do....	17,997,000
Average per day.....	do....	23,557,300
Average dynamic head against pumps, in feet.....		117.93
Duty=Gallons pumped $\times 8.34 \times 100 \times$ dynamic head.....		67,607,824
Total fuel consumed		
Cost of fuel, pumping 1,000,000 gallons 1 foot high.....	cents..	1.79
Total operative cost of pumping 1,000,000 gallons 1 foot high.....	do....	4.88
Total operative cost per 1,000 gallons pumped.....	do....	0.575

NOTES.—The above items of salaries, supplies, and repairs were furnished by the clerical division. The pumpage is figured from plunger displacement, without allowance for slip. The aggregate slip of all pumps during the year, based on pitometer determinations, was 7.73 per cent of the total displacement. The average dynamic head is figured from the total work done by pumping engines and generators. The fuel consumed is the total coal burned, excluding the heating system. The cost of heating (542,435 pounds of coal) was \$787.01.

Tests of private and municipal water meters (excluding meters on endurance test) during the fiscal year ending June 30, 1916.

Meter.	Size in inches.										Total.
	$\frac{1}{8}$	$\frac{1}{4}$	1	1 $\frac{1}{2}$	1 $\frac{1}{2}$	2	3	4	6		
American.....	62		3		4		1				70
Crown.....		1	2		6	6	10		2		27
Empire.....	4	6	3		1	4	5	1			24
Enarc.....		13	10	2	1	6					32
Eureka.....							4				4
Gamon.....	35										35
Gem.....					1	7	2				10
Hersey.....	1,801	153	25		24	16	6				2,025
Keystone.....	465	6	7		2	8	1	1			489
King.....	16				8	3					34
Lambert.....	150	201	46		18	11	5				431
Nash.....	40	214	114		75	44	24	7	2		520
Niagara.....		21	32		9	29	12				103
Pittsburg disk.....	20	4	7	3	12	27					73
Standard.....	2										2
Thomson.....		6	11	1	13	4					35
Trident.....	252	48	28		18	8	3	18			375
Union.....		1	14		3	3					21
Worthington.....	5,925	9	12		12	6	2	1			5,967
Total.....	8,772	683	320	15	227	165	63	28	4		10,277

The subdivision of "Miscellaneous drafting" is charged with the work of preparing all plans and estimates, and giving out miscellaneous information, correspondence, records, and reports. The detail of the work performed follows:

Drawings and tracings made.....	508
Projects made.....	131
Files forwarded to the assessor.....	110
Cards forwarded to the assessor.....	206
Postings of engineers' notes on 50, 100, and 300 foot scale maps and map tracings.	1, 663
Valve notes posted.....	482
Communications, reports, etc., written.....	3, 430
Locations for cut-offs given out.....	105
Permits passed.....	761

The routine work of the division consists of posting daily the 50, 100, and 300 foot scale maps and map tracings of the district; making projects for water-main extension, posting, daily, the work-in-progress maps and graphic log; working up daily the data showing pumping operations and water consumptions; making up cards showing mains, valves, etc., at street intersections; posting valve notes on intersection cards; passing schedules of work to be done under commissioners' orders; passing permits for terraces, copings and driveways, miscellaneous lettering; estimates and reports on water-main extensions and new connections, and general office work.

The titles of some of the mechanical drawings made are as follows:

Special 3 by 4 inch reducer.

Proposed centrifugal pump installation for west gate chamber of Brightwood Reservoir, the purpose being to use this pump to save water whenever reservoir is cleaned, by transferring water from one basin to the other.

Overflow cap for horse fountain.

Special parts required and method of installation of Beale-Moore hydraulic operators on No. 3 48-inch Eddy valve at Twenty-ninth and M Streets NW.; and on two 48-inch valves at Fourth and College Streets, N.W.

Revised drawings of $\frac{3}{4}$, 1, and $1\frac{1}{2}$ inch curb cocks in accordance with new standard.

Lower portion of special 36-inch hydraulic taper seated valve.

Forty-eight, 42, and 40 inch special blank flanges.

Portion of engine room, district pumping station, showing suction and discharge mains and available space for the installation of proposed 5,000,000-gallon centrifugal pump.

Special flange castings for 5,000,000-gallon centrifugal pump installation.

Cap for 4-inch boiler tubes.

Cap for fountain overflow.

Piston rings for 20-inch cylinders.

Automobile-driven valve operator, for operating large valves.

The following drawings of an architectural nature were made:

Proposed auto sheds in west property yard of District pumping station; sketches and estimate of cost.

Changes required in stables at District pumping station to allow storage of automobiles; drawings and specifications.

New set of drawings for proposed reinforced cover for Reno Reservoir.

Estimates and reports on several methods of construction which might be used in covering Reno Reservoir.

New reinforced concrete design and estimate for covering Reno Reservoir.

Plan and index to lockers in room 314.

Tool house for gardener and shelter for wagons carrying oil pump at Anacostia pumping station.

Paint shops added to municipal garage proposed for erection on Bryant Street, between Second and Fourth Streets NW., and new set of nine drawings made, together with specifications and estimate of cost.

New drawings and revision of storeroom plans at District pumping station.

Of maps and plans made the following are worthy of mention:

Transportation map of the District of Columbia, showing character of pavements in improved streets by means of colored inks. To be used in routing trucks to various jobs.

Twenty-one new 50 and 100 foot scale water main maps were made, together with two tracings of each. In addition to this, 20 new tracings of 50 and 100 foot scale maps were made to replace those in a dilapidated condition.

Revised and completed map showing surface and subsurface construction around Anacostia pumping station.

Index map to first valve-location book records of the water department.

Buildings and grounds of Bureau of Standards, showing proposed installation of fire hydrants.

Smithsonian grounds showing water mains.

Topographic map showing alternate routes of proposed water mains for supplying Washington Steel & Ordnance Co.'s plant.

Quite a number of diagrams and charts were made, the titles of which follow:

Diagram showing water consumption, services, meters in use, etc., from 1896 to 1915.

Diagram showing estimated and actual receipts and expenditures of water department for fiscal year 1915-16. On this diagram the estimated total receipts and expenditures for labor, requisitions, contract payment, miscellaneous, and total expenditures were platted in red ink, and at the end of each month the actual total receipts and expenditures were platted in black ink.

Diagram showing water rent and total consumption per day for fiscal year 1914-15.

Small organization chart of the division heads of the office of municipal architect, District of Columbia.

Chart showing cost of materials per cubic yard of concrete for standard mix 1:2:4; 1:2½:5; 1:3:6.

Functional and expense diagram of water department for fiscal year ended June 30, 1915.

New organization chart of the water department, using rectangular blocks instead of circles.

Chart showing the various departments, bureaus, independent offices, and commissions of the executive branch of the United States Government; also the organization of the District of Columbia government.

Diagram showing average daily consumption on first, second, and third high-service areas for fiscal years from July 1, 1908, to June 30, 1915.

New table giving number of gallons of water in Reno Reservoir for each one-tenth foot of elevation.

Chart showing condensed screw data.

Chart showing comparative meter rates in 10 of the large cities of the United States.

Chart showing subdivisions and standing-job numbers of the water department.

Titles of some of the miscellaneous drawings made are:

Method of offsetting 30-inch water main on Pennsylvania Avenue Bridge SE.

New design for bronze tablet erected by the employees of the water department in memory of the late superintendent, Walter A. McFarland.

Proposed partition wall and rearrangement of intake mains at Reno Reservoir.

Small car to carry electric lights through 20-inch drain at Brightwood Reservoir.

Other items of work performed by this division are as follows:

Compiled list giving location of all large valves in District on which by-passes are found.

Made-up set of cards for use in computations of duty at District pumping station.

Named, numbered, and indexed 100 stereopticon slides, illustrative of water department property, work, etc.

The water registrar's books of 50 and 100 foot scale water-main map tracings were posted three times during the year.

Compiled water department statistics for year ended June 30, 1915, for Department of Commerce, Bureau of Census.

Compiled data to be used in revising diagram showing maximum and minimum meter rates in United States cities over 100,000 population.

Made-up list showing pressures in various apartment houses.

The organization chart of the District of Columbia government was revised three times during the year.

The organization chart of the water department was revised three times during the year.

During the year 40 sets of blue prints of the 300-foot scale maps were prepared for distribution to the field parties. A new system was put into operation, which made quite a large saving in the number of blue prints required. A card index was prepared, allowing a card for each sheet of the set; on these cards a record is kept of each sheet that is posted during the year, and only those sheets are printed that have been posted since the last prints were made. The last time the prints were made it was necessary to make prints of only 20 out of the 30 sheets in the set.

The description of the posting of the graphical log, the pressure map, the checking of new subdivisions for possible water main assessment, posting of valve notes, green cards for water registrar, posting of tap cards, locations for cut-offs, and daily light report will be found in last year's report of this division.

On April 4, 1916, Mr. Haar, of this division, was detailed as inspector on the construction of reinforced concrete cover for Reno Reservoir, and on May 2, 1916, another man of this division was detailed to help him. The following is a detailed report or this work:

The growth of algae in the reservoir storing filtered water has caused much trouble and its elimination has required the expenditure of considerable money for cleaning the basins at frequent intervals each year. As this algae grows wherever sunlight strikes water it was proposed to cover the Reno Reservoir, at Donaldson and De Russey Streets NW.

Plans and specifications for two designs of concrete covers of beam and girder construction were made up by our draftsmen; one with a live load of 50 pounds per square foot and the other for a live load of 75 pounds per square foot. The proposal allowed several alternate designs of various roof constructions to be submitted for consideration so that a number of designs would be available from which to make a choice.

Bids for this work were opened March 2, 1916. It was found that the estimates ranged from \$15,190 to \$26,000. The estimated cost of the two designs prepared by the water department was \$17,300 and \$24,800, respectively.

The lowest bidder, Edgar H. Mosher, submitted a plan for a concrete cover of flat slab construction, designed according to the Turner system of flat slab concrete floors, to carry a live load of 75 pounds per square foot, which he agreed to construct for \$15,190. This design was revised to comply with the Chicago code for flat slab floors. As both the Turner and Chicago codes were complied with in the design, the cover should embody all the desirable features of both systems. Three-eighth inch diameter round steel bars were substituted for five-sixteenths-inch round bars in the slab reinforcement. This change added \$350 to the cost. With this addition to the contract price the bid was still \$660 less than the next highest bidder. During the progress of construction it was found necessary to have placed 43 cubic yards of concrete and 3 tons of steel in addition to the amount called for on the plans. This additional work required an extra \$830, making the total cost of the work \$16,370.

The construction work was started April 3, 1916. Work was begun at the south end of the reservoir and progressed toward the north. The footings were placed directly on the old 15-inch concrete floor. The old floor was first thoroughly tested and was found to be sufficiently strong at all places to sustain the additional load. Metal forms were used throughout, except for the footings and the column capitals. These forms were made of wood.

The 6-inch flat slab was supported on 133 columns, 16 inches square. There are 19 rows of columns from north to south and 7 columns to the row. The area covered by the floor is approximately 44,600 square feet. The column tops are flared out at 45° forming square capitals 4 by 4 feet at their tops. The footings upon which the columns rest are 45 inches square and 18 inches thick.

The slab was poured in sections averaging 16½ feet wide, extending across the basin from east to west. Construction joints were always made in the center of a span. Topping composed of 1 part cement and 2 parts sand was placed as soon as the base was set sufficient to bear a man's weight. This topping was troweled to a smooth finish.

The concrete for the footings and columns was mixed with a one-batch mixer and placed with wheelbarrows. The concrete or the slab was mixed in a Ransome two-batch mixer, using a tower and spouts to convey the concrete to its place. Both mixers were driven by gasoline engines. The mixture throughout consisted of 1 part Tide-water Portland cement, 2 parts sand, and 4 parts gravel. After concreting was well underway approximately 100 cubic yards were placed per week.

At the end of June, 1916, approximately 75 per cent of the area of the reservoir was covered. The cost per square foot was \$0.367.

This division had complete supervision of the construction of this work. The principal inspector was Herbert R. Haar, who was assisted by John E. Linder.

Other work for which men of this subdivision were detailed during the year is as follows:

	Days.
Public Utilities Commission.....	18
Field work, division D.....	3
Tests and experiments, routine work.....	57
Tests and experiments, special tests.....	32
Telephone exchange.....	7

117

Leave of absence of 153 days was granted the men during the year.

For the greater part of the year there were eight men in the subdivision, including Mr. Heins, in charge. In May another man was added on account of two men being detailed to Reno Reservoir. But on account of leave of absence and details to other work, 382 days' work should be deducted, which would leave about seven men to perform the actual work of the subdivision.

Most organizations recognize the fact that office men are more in need of vacations than field men, but the opposite is in effect in this division, as we have only one man on the annual roll. I think that for increased efficiency it is desirable that more positions in the drafting division be placed on the annual roll.

The performance of the vast amount of detail and special work by division E was rendered possible only through the harmonious cooperation of the men of the division, and I take this opportunity to thank them for their willing and efficient assistance.

D. W. HOLTON,
Assistant Engineer.

THE SUPERINTENDENT, WATER DEPARTMENT.

STEAM ENGINEERING AND SHOPS.

Sir: The following is a summary report of work done at the district pumping station during the fiscal year beginning July 1, 1915, and ending June 30, 1916:

Water pumped, figured from plunger displacement:

First high service.....	gallons..	5, 535, 803, 610
Second high service.....	do....	2, 426, 998, 600
Third high service.....	do....	660, 751, 530
Total.....	do....	8, 623, 553, 740
Coal burned.....	tons..	5, 845. 71
Cylinder oil used.....	gallons..	717. 84375
Engine oil used.....	do....	1, 389. 0625
Grease used.....	pounds..	372
Waste used.....	do....	700

The regular force employed for the operation of the pumping engines, boilers, and auxiliaries, cleaning of machinery, etc., is as follows:

	Steam engineers.	Assistant steam engineers.	Firemen.	Oilers.	Cleaners.	Laborers.
Sunday.....	3	3	3	4	4	0
Week days.....	3	3	3	4	4	4

For the fourth high service the water is pumped from the Reno Reservoir (which is supplied by the third high service pumps) to an elevated tank by gasoline engines and triplex pumps. This machinery is operated daily by the watchman in charge of the reservoir and one assistant on night duty. The water pumped for this service during the year was 62,090,565 gallons, or a mean of 170,111 gallons daily.

The Anacostia pumping station has been operated without interruption during the year, pumping to the three towers supplying the area east of the Anacostia River. This station is taken care of by two men.

The water pumped during the year, figured from plunger displacement, follows:

First high service.....	104, 134, 500
Second high service.....	4, 947, 684
Total.....	109, 082, 184

or a mean of 298,855 gallons daily.

REPAIR SHOPS.

The work accomplished during the year follows:

All necessary repairs for the machinery at the District pumping station, fourth high service and Anacostia stations; repairs to automobile trucks, both for this department and the several departments of the District of Columbia; made practically all repair parts for fire plugs, valves, street hydrants, etc., including all tools used on the work of laying water mains, etc., such as picks, chisels, breakers, calking tools,

various irons, valve keys, pipe bands, eyebolts, arch irons, and miscellaneous tools and appliances as required for the various work.

The detail of the work follows in part:

Replaced four pump chambers on 12,000,000-gallon vertical triple-expansion pumping engine, without dismantling any of the superstructure; replaced 36-inch hydraulic valve body in discharge main on first high service; put braces on steam main; repaired Avery scales; made new piston for oil pump; repaired gates and fence at Brightwood Reservoir; made brace irons for 24-inch pipe, Brightwood Reservoir; installed tank and pipe for gasoline pump in new repair shop; erected overhead hoist in new repair shop; moved brass foundry to new building; made pipe posts for railing on Q Street Bridge; moved and set up machinery in new repair shop; erected gates at new entrance to west yard; moved gasoline and kerosene storage tanks from west yard to receiving platform and tested same; inspected material for Public Utilities Commission; relined boiler furnaces; tested new autos for department; demonstrated auto lawn mower at Brightwood Reservoir; connected cooling cells for heating system; made and erected ladder at Pennsylvania Avenue Bridge; extended chutes for coal hoppers; made valve stem for engine at District of Columbia asphalt plant; cleaned out water softener; built road roller of 36-inch pipe; installed new economizer and made feed pipe connections for same; put in concrete foundation for new centrifugal pump; made 8 screws for 30-inch valves; changed feed line in engine room from 2-inch to 3-inch pipe to take care of feed line from new centrifugal pump; repaired iron fence at north entrance to Brightwood Reservoir; erected washer for autos in garage; repaired leaks in steam lines, economizer, and Holly drip system; repaired dirt rammer and pipe machines; put new tubes in boilers when necessary; repaired and cleaned out heating system in garage; repaired drinking and horse fountains; erected memorial tablet in pumping station; built seventy-eight 3 and 4 way valves with 6 and 8 inch bells, forty-two 4-inch, thirty-six 6-inch, one hundred and twenty 8-inch, and twenty 12-inch gate valves; repaired 2-way valves as follows: Five 3-inch, thirty-six 4-inch, forty-three 6-inch, eighteen 8-inch, three 12-inch, four 4-way, and five 3-way, total 114 valves; repaired 37 Buckeye melting furnaces; reversed bells on 66 fire hydrants; made valve springs for pumps and fire hydrants; cut pipe and pipe nipples for storekeeper; repaired 2,846 water meters; repaired main valves for fire plugs; repaired 24-inch Eddy valve; made 12 main valve stems for fire plugs; assembled 15 street hydrants; unloaded tank cars of fuel oil for Anacostia station (this work consists of pumping the oil from the car at the Twining City siding to the storage tank at the station); sharpened horse-clipping knives; and completed numerous small jobs for the department.

BRASS FOUNDRY.

During the year all composition metal castings for valve work, repair parts, etc., have been made in our foundry, which has been operated without interruption. There were made in the foundry 19,446 pounds of brass castings, small and medium size, such as would be made in a general jobbing shop, also 50 pounds of aluminum castings for the electrical department. The showing of the foundry for the year is very satisfactory, and the repair work at this station has been much expedited by the casting of repair parts when needed for emergency. Attention is invited to the annual report of the foundry.

BLACKSMITHING.

The blacksmiths have made 10 curb and extension keys, 38 casing hooks, 49 meter-box keys, 54 calking sets, 32 pipe hangers, and 159 new chisels; made and sharpened 152 drills; repaired 172 stakes; sharpened 7,259 chisels and 11,925 picks; welded 118 new ends on picks; repaired 137 curb and extension keys; made and repaired 57 frost pins; repaired casing hooks, meter-box keys, calking sets, tunneling bars, angle irons, lifting chisels, pipe bands, meter wrenches, steel bars, pipe hangers, drills, and mat-tacks, and made necessary repairs to wagons and auto trucks.

CARPENTRY.

The carpenters have repaired pitometer field boxes; made drawer cases for office; built new entrance to west yard; inspected building for auto shop; made battery boxes for Anacostia station, work-in-progress board, screens for Anacostia station, and screens for stable; laid cement walk for brass foundry; removed fence around parking of lodge at Brightwood Reservoir; built coping and set gate at Brightwood Reservoir; built sand bins and coke bins for foundry; made cabinet for stable office; made sign-boards and built tool boxes and shelves for new shops; made tool locker for blacksmith shop; removed wall and closed up old entrance to west yard; put cover over auto pit

in west yard; repaired furnace at Brightwood Reservoir lodge; made blinds for foundry and repair shop; built tool lockers for auto shop; made filing cabinet for storeroom; made screens and built porch for Reno lodge; repaired roof of pumping station; built pipe platform at Reno Reservoir; built cabinet for CO₂ recorder; covered boilers with insulating brick; put concrete shelves under stokers of No. 5 and No. 6 boilers; built tool house at Anacostia station; built cardcases for water registrar's office; made flower boxes for Brightwood lodge; boxed patterns for shipment; made various patterns for repair parts, etc.; made 1,606 concrete rings, 485 sectional rings; filled 630 casing covers; roughed 631 covers; filled 297 meter-box covers; and made 304 concrete cylinders.

PAINTING.

The painters have painted wagons and automobiles, tank at Thirtieth and R Streets SE.; pitometer boxes; calked and painted boats for Brightwood Reservoir; painted fence at Brightwood Reservoir; made storm covers for engineer's wagons; painted gate house at Reno; crane at Anacostia; also wood work of pump house and lodge; pipe and ladders in Reno Reservoir; storehouse under wagon shed; beams and clamps for pipe on Q Street Bridge; pipe on Pennsylvania Avenue Bridge; walls of lodge at Anacostia; fence around yard at pumping station; bridge at Woodridge; pipe on P Street Bridge; woodwork of auto sheds and porch at Reno; walls and ceiling in blacksmith shop, machine shop; walls in boiler room; pipe over College Pond; lettered signs for lawn; finished cardcases for water registrar's office; inspected pipe work on Calvert Street Bridge, and Klingle Road Bridge; and painted 12-inch main across Klingle Ford Bridge; made and repaired curtains and cushions for wagons, autos, and buggies; and other miscellaneous work.

ELECTRICAL WORK.

The electrician and helpers have taken care of generators, switchboards, motors, lights, etc.; operated conveyor, economizer scrapers, and crane; tested and recharged storage batteries; repaired electric fans; made repairs and adjustments on motor at Union Station Plaza; inspected electrical work in new auto shop; connected telephones in brass foundry and auto shop; insulated wires and put guard rail on crane at Anacostia; repaired lights and battery at Reno lodge; put up conduit and wiring for gatehouse at Brightwood Reservoir; put in automatic alarm bell at Anacostia; put up conduit and connected motor on top of economizer; put in meter connection and lights in tool house at Brightwood Reservoir, and conduit for lights at Reno Reservoir; put lights under Q Street Bridge.

CARE OF STATION.

The janitor and his force have taken care of all cleaning throughout the building, removing shavings from the woodworking shop; attended to window cleaning; removing turnings, scrap, and other débris from machine shop; furnished messenger service to the office, etc.

JAS. T. FINK, *Master Mechanic.*

THE SUPERINTENDENT, WATER DEPARTMENT.

WATER SURVEYS.

WASHINGTON, D. C., August 26, 1916.

SIR: As long as the cost of abandoning and replacing all old and defective pipe construction in a water-distribution system is prohibitive, and repairs, which include the removal of the primary cause of the trouble in each instance, are practically impossible, underground leakage can not be eliminated, but must be considered as a necessary waste to be controlled and minimized. The efforts of the water-survey division for the past 10 years have been centered upon the devising of a system of surveys so thorough and exact that at the completion of detailed work under it in any section no measurable leakage should exist. In spite of the splendid results accomplished, however, it is never assumed that all leakage is eliminated in the particular section, but rather that, scattered throughout its entire area, remain hundreds of minute sources of waste, daily increasing in number and in discharge, reaching such proportions within a year or two that their existence can not longer be ignored. Of such nature was composed the 1,981,600 gallons daily underground leakage discovered and stopped during the last fiscal year. This represents the loss daily through 420 separate leaks, averaging 4,700 gallons per day each. Reference to statement No. 1 shows that this is the smallest average that has been obtained, and, comparing this figure with those of the previous years clearly brings out the fact that neglect of the leaks produces serious conditions, due to their gradual enlargement. The most fruitful source

of leakage was found in the calked lead joints of the small service mains, a total of 101 cases, discharging 607,350 gallons daily, being found. One hundred and thirteen corroded iron services, discharging 449,440 gallons daily, represent the second important source. Wiped joints, wasting 342,490 gallons daily; broken lead and pewter services, 201,380 gallons; broken cast-iron mains, 142,800 gallons; and defective screw couplings, unions, etc., discharging 115,450 gallons daily, are named in quantitative order as fruitful sources of underground waste. The full statement of the nature of the various leaks is given on statement No. 2, and again on statement No. 3, in comparison with previous years' results.

The leaks on the calked joints were due in most cases to the insufficient quantity of lead used previously with a false idea of economy. With sufficient lead a calked joint is wonderfully flexible, as determined by recent tests, but with the old joints, where the quantity of lead was stinted, the slightest deflection of the pipe, due to settlement or other causes, serves to open a crevice through which loss takes place. The small number of defective joints found on all recent pipe installation work furnishes ample verification of this point. The corrosion of the wrought-iron service pipes is taking place rapidly and leaks from this source will continue in occurrence for years to come. Provision of the plumbing regulations prohibits the repair of these pipes under improved pavements, and this results in the abandonment of many of them. A vast quantity of this class of pipe in the ground will not be abandoned, however, for many years, and in the meantime must be kept under constant surveillance. The leaks in the wiped joints on lead services and on lead connections to iron services represent a class somewhat different from the others mentioned, in that a number of the leaks due to them is found on the work of recent date of the highest class, and where quality apparently was not sacrificed for economy. This situation calls for an arraignment of the wiped joint as an underground connection, and the question of whether this type of joint should be abandoned for some other calls for an investigation. The leaks on the lead services can be traced in most instances to the light weight of the pipe previously used. The present regulations specify a heavy weight pipe, which seems to be perfectly satisfactory, and provision is carried prohibiting the repair of the old light weight lead pipe, which is proving unadapted to modern conditions. This is gradually bringing about the weeding out of this pipe, but the process is necessarily slow. The breaks in cast-iron mains in most cases were due to the defective workmanship on the old pipe. The modern pipe now used by the department is practically free from breakage, except where due to severe stress conditions which can not be foreseen or provided against.

The routine work of the year embraced the fourth survey of permanent districts G, I, K, and L, or the entire first high service; district E (territory west of Fourteenth Street NW.) of the gravity service; the third survey of district H (Anacostia pump services); the survey of the Reno service; and miscellaneous work in the northeast section of the gravity service. The statements showing the detailed results by districts are included in the supplements to this report.

Routine house inspection was carried on in connection with the work wherever unmetered premises were located. This activity is gradually reducing each year, due to progress of meter installation. A total of 6,191 premises was inspected, however, resulting in leaks being found in 480, or 7.8 per cent. Attention is invited to statement No. 4, showing the excellent results accomplished by this work in the reduction of waste due to leaking fixtures within the houses and other buildings. The statement shows that when this work was started a large number of premises was guilty of wasting water through defective fixtures. The reduction in percentage is very material and undoubtedly saves much water. The disposition of all leaks found in this work is left to the office of the water registrar, which office serves cut-off notices and secures the stoppage of the waste, reporting back to the office of the water-survey division for record.

The largest individual leaks of the year were on calked lead joints. Examples of these are a 6-inch joint on Carroll Street, between First and Second Streets SE., wasting water at the rate of 78,800 gallons per day; a 12-inch joint at Fifteenth and W Streets NW., 40,000 gallons daily; and a 6-inch joint in the United States Soldiers' Home grounds, 30,000 gallons daily. The importance of detecting these leaks promptly can not be overestimated, not only because of the value of the water involved, but because of the danger of accidents due to the undermining of the pavements and interruption of the water service. The leak at Fifteenth and W Streets NW. was on a high-pressure trunk line to the Reno Reservoir, and its prompt discovery and repair were doubly important.

A work of considerable importance undertaken and successfully completed by employees of this division was the stoppage of practically all leakage entering the railway tunnel on First Street east from adjacent water mains. This water was the

cause of considerable uneasiness on the part of railway officials and undoubtedly aggravated the settlements of the street surfacing over the tunnel. An incidental result of tests in Cleveland Park was the discovery that the officials of the Industrial Home School refilled the swimming pool at that place whenever necessary at a high rate from a fire hydrant connected to the Reno mains. This practice was responsible for serious and previously unexplained slumps in the pressures. Arrangements were made by this office for notification of the pumping station whenever the hydrant was to be opened for this purpose.

Special work of the year was composed principally of investigation of the use of water by Federal and municipal institutions, and preparation of plans, etc., leading to the prevention of waste by shutting off unnecessary flows, securing abandonment of wasteful machines and fixtures, installation of cooling towers, river water pumping plants, and reuse of water on mechanical operation wherever possible.

Summarizing the above as applied to Federal institutions, we may mention changes in the United States Soldiers' Home grounds, brought about entirely by pressure from this division, embracing the shutting off of the Reno supply, abandonment of wasteful fixtures and repairs to leaks, saving about 100,000 gallons daily; changes in the water system at the State, War, and Navy Building, embracing the installation of 2-inch float valve on elevator accumulator tank, prevention of overflow of elevator surge tank, and abandonment of wasteful plumbing system and fixtures, saving approximately 150,000 gallons daily; abandonment at the Bureau of Standards of defective float valves, thereby saving 80,000 gallons daily; and compilation of data of water consumption in unmetered Federal buildings and reservations, thereby aiding in saving a large quantity of water accomplished by the installation of meters, and securing the shutting off of all display fountains at night. The results accomplished in municipal buildings were indefinite as regards the quantity of water saved, because of the relatively small size of the flows involved. However, the saving was substantial and was accomplished at very little expense. Reports were forwarded by this office calling attention to apparently excessive use of water, especially at night, in the Municipal Building, Municipal Market, Central High School, and Eckington School, resulting in immediate reduction in consumption and waste. A list of municipal water users and an analysis of their consumption was prepared and submitted by this division during the year, and resulted in calling attention to abuses of the free-water privilege in many instances. The chief abuses noted were continuously running drinking fountains and other sanitary fixtures in schools and police stations. Steps are now underway which will result in the correction of these.

In addition to routine and special work for the direct reduction of water waste, much other work was done by this office during the year, some of it leading indirectly to water saving, and the balance having no bearing upon the question, but being comprised of tests, experiments, and similar work relating to the other branches of the department. Summarizing these lines, we may mention the compilation of data relative to the financial relation of the water department to the United States and District of Columbia Governments; experiments with pneumatic calking tools; construction and installation of multiple recording manograph for measuring water delivered by pumps at the District Pumping Station; construction of pitot tubes, calibration of pump slip indicators, and miscellaneous studies of water delivery and consumption problems in several large buildings, together with periodic measurements of water delivered to Federal institutions, and tests of large meters. On January 1, 1916, the name of this division was changed from "pitometer division" to "division of water survey," the reason being to broaden the designation to indicate these miscellaneous activities.

The total cost of running this division for the year was \$34,210.77, including all charges for extensions of equipments, overhead costs, and operation. This is somewhat less than the corresponding figure of last year, due to the reduction in the number of employees and the substitution of two motor trucks for the five teams previously used. The total quantity of leakage and waste stopped was considerably in excess of 2,000,000 gallons daily, an excellent showing when the relatively small size of the leaks is considered. In making deductions from the comparison of costs and results, the point must be borne in mind that the investment must be figured, not on the quantity of water wasting at the time of the detection of the leaks but upon the increasing quantity which would be wasted should they remain undetected, and consideration must also be given to the miscellaneous work of the division, which, while producing no return in water saving nevertheless is necessary and has a decided value to the department.

Very respectfully submitted.

The SUPERINTENDENT WATER DEPARTMENT.

PAUL LANHAM,
In Charge Water Survey.

SUPPLEMENTS, 1915-16.

Statement No. 1.—Underground leaks, 1907-1916.

Statement No. 2.—Year's results, 1915-16.

Statement No. 3.—Sources and quantities of underground leakage, 1907-1916.

Statement No. 4.—Results, house inspection, unmetered, 1907-1916.

Statement No. 5.—Surveys of permanent districts:

- A. District E.
- B. District G.
- C. District H.
- D. District I.
- E. District K.
- F. District L.
- G. District Reno (miscellaneous).
- H. District F (miscellaneous).

STATEMENT NO. 1.—*Underground leaks, 1907-1916.*

Year.	Number.	Quantity per day.	Average per day.
		<i>Gallons.</i>	<i>Gallons.</i>
1907-08.....	271	5,604,400	20,700
1908-09.....	832	9,560,600	11,500
1909-10.....	532	6,364,200	12,000
1910-11.....	624	6,921,900	11,100
1911-12.....	813	5,115,300	6,300
1912-13.....	651	4,195,100	6,400
1913-14.....	452	2,552,800	5,600
1914-15.....	385	1,828,820	4,800
1915-16.....	420	1,981,600	4,700
Total (9 years).....	4,980	44,124,720	8,900

STATEMENT NO. 2.—*Year's results, 1915-16.*

Service pipes inspected:	
Metered.....	36,250
Unmetered.....	23,703
Houses inspected, unmetered.....	6,191
Houses with defective fixtures (7.8 per cent).....	480
Number of notices served.....	205
Number of services cut off.....	39

Underground leakage.

Class.	Number.	Gallons per day.	Class.	Number.	Gallons per day.
Abandoned services, taps, etc.	4	68,700	Broken mains.....	4	142,800
Iron services.....	113	449,440	Valves.....	3	3,300
Lead services.....	41	201,380	Blow-offs.....	1	8,600
Wiped joints.....	70	342,480	Fire hydrants.....	4	13,400
Couplings.....	63	115,450			
Stopcocks.....	16	28,700	Total.....	420	1,981,600
Joints on mains.....	101				
		607,350			

PHOTOGRAPHIC WORK.

Blue prints made for division E.....	2,205
Blue prints made for division B.....	328
Photographic plates exposed, developed, etc.....	28
Photographic prints exposed, developed, etc.....	69

EXPENSES.

Per diem labor and material:	
Operating.....	\$32,403.91
New work.....	1,806.86
	34,210.77

STATEMENT NO. 3.—*Sources and quantities of daily underground leakage, 1907-1916.*

Class.	1907-8	1908-9	1909-10	1910-11	1911-12	1912-13	1913-14	1914-15	1915-16
Abandoned services and taps.....	Gallons. 355,300	Gallons. 173,600	Gallons. 174,200	Gallons. 180,900	Gallons. 101,700	Gallons. 54,700	Gallons. 68,700		
Iron services.....	2,729,000	2,438,000	1,508,900	2,329,800	1,988,800	921,000	861,950	449,440	
Lead services.....		1,201,900	1,237,600	976,700	394,000	471,000	254,100	201,380	
Wiped joints.....	327,000	5,214,000	710,100	666,700	438,100	282,300	237,000	213,500	342,490
Couplings.....			118,700	182,900	123,700	75,600	66,900	20,500	115,450
Stopcocks.....			84,800	43,300	53,500	32,900	16,900	17,150	28,700
Street washers.....				42,000	10,400	5,700	500		
Joints on mains.....	1,639,900	1,345,600	1,634,200	2,502,500	746,300	962,300	596,800	368,800	607,350
Broken mains.....	1,200,000	117,000	332,000	15,900	7,000	103,300	62,200		142,800
Valves.....	23,500	62,000	89,100	110,900	27,100	13,200	6,800	300	3,300
Blow-offs.....		737,000		176,600	71,300	6,000			8,600
Fire hydrants.....	174,000	45,500		19,200	3,500	115,000	500	5,120	13,420
Public hydrants.....				84,200	50,200	21,000	12,000	500	
Unclassified.....	111,000	2,039,500		97,600	103,800	15,000	56,500	32,200	
Total.....	5,601,400	9,560,600	6,364,100	6,921,900	5,115,600	4,196,000	2,552,800	1,828,820	1,981,630

STATEMENT NO. 4.—*Results, house inspection, 1907-1916, unmetered.*

Year.	Houses inspected.	Houses with defective fixtures.	Percentage.	Year.	Houses inspected.	Houses with defective fixtures.	Percentage.
1907-8.....				1912-13.....	26,397	3,725	14.1
1908-9.....	27,778	4,621	16.6	1913-14.....	17,039	1,603	9.4
1909-10.....	21,642	3,305	15.2	1914-15.....	17,563	1,691	9.6
1910-11.....	21,547	3,262	15.1	1915-16.....	6,191	480	7.8
1911-12.....	31,289	4,943	15.7				

1 No records.

STATEMENT NO. 5A.—*Pitometer District E, Survey No. 4.*

Date of measurement, Sept. 21-28, 1915.	
Mean daily supply.....	gallons.. 5,667,600
Minimum night rate.....	do. 3,912,000
Ratio of minimum night rate to mean daily supply.....	per cent.. 69
Per capita consumption (resident population).....	289
Subdivision survey:	
Started, June 5, 1915.	
Finished, Sept. 13, 1915.	
Cost.....	\$3,530.12

Population:

Resident—

Metered.....	6,430
Unmetered.....	13,201
Total.....	19,631

Floating—

Metered.....	6,954
Unmetered.....	4,178
Total.....	11,132

Buildings:

Dwellings—		
Metered.....	751	
Unmetered.....	3,110	
Hotels and apartments—		
Metered.....	53	
Unmetered.....	2	
Restaurants—		
Metered.....	23	
Unmetered.....	0	
Factories—		
Metered.....	13	
Unmetered.....	1	
Municipal buildings—		
Metered.....	10	
Unmetered.....	1	
Federal buildings—		
Metered.....	0	
Unmetered.....	3	
Miscellaneous—		
Metered.....	456	
Unmetered.....	454	
Total—		
Metered.....	1,306	
Unmetered.....	3,571	
Total night flow detected by subdivision tests, per day.....	gallons..	1,925,320
Due to flow inside metered premises.....	do.....	542,800
Due to flow inside unmetered premises.....	do.....	578,900
Due to underground leakage—		
Services.....	do.....	399,400
Mains.....	do.....	73,200
Unclassified.....	do.....	11,000
Total.....	do.....	483,600
Due to municipal consumption.....	do.....	42,920
Due to Federal consumption.....	do.....	115,200
Total flow accounted for.....	do.....	1,763,420
Total flow unaccounted for.....	do.....	161,900

STATEMENT NO. 5B.—*Pitometer district G, Survey No. 4.*

Measurement, Oct. 4-11, 1915.

Mean daily supply.....	gallons..	2,736,000
Minimum night rate.....	do.....	1,632,000
Ratio of minimum night rate to mean daily supply.....	per cent..	60
Per capita consumption (resident population).....		83
Subdivision survey:		
Started Sept. 10, 1915.		
Finished Jan. 10, 1916.		
Cost.....		\$5,163.89

Population:

Resident—		
Metered.....	30,460	
Unmetered.....	2,596	
Total.....	33,056	
Floating—		
Metered.....	7,704	
Unmetered.....	2,373	
Total.....	10,077	

Buildings:	
Dwellings—	
Metered.....	6,595
Unmetered.....	651
Hotels and apartments—	
Metered.....	67
Unmetered.....	4
Restaurants—	
Metered.....	6
Unmetered.....	0
Factories—	
Metered.....	2
Unmetered.....	0
Municipal buildings—	
Metered.....	19
Unmetered.....	1
Federal buildings—	
Metered.....	1
Unmetered.....	4
Miscellaneous—	
Metered.....	514
Unmetered.....	112
Total—	
Metered.....	7,204
Unmetered.....	772
Total night flow detected by subdivision tests, per day..... gallons..	1,605,250
Due to flow inside metered premises.....do.....	493,750
Due to flow inside unmetered premises.....do.....	130,100
Due to underground leakage—	
Services.....do.....	229,200
Mains.....do.....	135,650
Unclassified.....do.....	17,400
Total.....do.....	382,250
Due to municipal consumption.....do.....	61,080
Due to Federal consumption.....do.....	440,300
Total flow accounted for.....do.....	1,507,480
Total flow unaccounted for.....do.....	97,770

STATEMENT NO. 5C.—*Pitometer district II, Survey No. 3.*

No measurement made.

Subdivision survey:

Started Sept. 15, 1915.

Finished Oct. 5, 1915.

Cost.....\$751.76

Population:

Resident—

Metered.....	3,579
Unmetered.....	55

Total.....	3,634
------------	-------

Floating—

Metered.....	1,122
Unmetered.....	2

Total.....	1,124
------------	-------

Buildings:	
Dwellings—	
Metered.....	687
Unmetered.....	14
Hotels and apartments—	
Metered.....	0
Unmetered.....	0
Restaurants—	
Metered.....	0
Unmetered.....	0
Factories—	
Metered.....	0
Unmetered.....	0
Municipal buildings—	
Metered.....	8
Unmetered.....	0
Federal buildings—	
Metered.....	1
Unmetered.....	0
Miscellaneous—	
Metered.....	20
Unmetered.....	4
Total—	
Metered.....	716
Unmetered.....	18
Total night flow detected by subdivision tests, per day..... gallons..	54,700
Due to flow inside metered premises.....do.....	53,700
Due to flow inside unmetered premises.....do.....	0
Due to underground leakage—	
Services.....do.....	1,000
Mains.....do.....	0
Unclassified.....do.....	0
Total.....do.....	1,000
Due to municipal consumption.....do.....	0
Due to Federal consumption.....do.....	0
Total flow accounted for.....do.....	54,700
Total flow unaccounted for.....do.....	0

STATEMENT NO. 5D.—*Pitometer district I, survey No. 4.*

Measurement, October 4-11, 1915.

Mean daily supply.....gallons..	¹ 6,552,000
Minimum night rate.....do.....	¹² 736,000
Ratio of minimum night rate to mean daily supply.....per cent..	42
Per capita consumption (resident population).....	

Subdivision survey:

Started, February 2, 1916.

Finished, May 1, 1916.

Cost.....	\$2,466.29
-----------	------------

Population:

Resident—

Metered.....	21,456
Unmetered.....	2,149
Total.....	23,605

Floating—

Metered.....	7,493
Unmetered.....	791
Total.....	8,284

¹ Districts I and K were measured together.

Buildings:	
Dwellings—	
Metered.....	3,661
Unmetered.....	466
Hotels and apartments—	
Metered.....	101
Unmetered.....	3
Restaurants—	
Metered.....	0
Unmetered.....	0
Factories—	
Metered.....	0
Unmetered.....	2
Municipal buildings—	
Metered.....	11
Unmetered.....	4
Federal buildings—	
Metered.....	4
Unmetered.....	0
Miscellaneous—	
Metered.....	418
Unmetered.....	101
Total—	
Metered.....	4,195
Unmetered.....	576
Total night flow detected by subdivision tests, per day..... gallons.....	1,123,100
Due to flow inside metered premises..... do.....	503,100
Due to flow inside unmetered premises..... do.....	143,400
Due to underground leakage—	
Services..... do.....	224,400
Mains..... do.....	72,300
Unclassified..... do.....	41,600
Total..... do.....	338,300
Due to municipal consumption..... do.....	76,800
Due to Federal consumption..... do.....	10,000
Total flow accounted for..... do.....	1,071,600
Total flow unaccounted for..... do.....	51,500

STATEMENT NO. 5E.—*Pitometer district K, survey No. 4.*

Measurement, October 4–11, 1915.

Mean daily supply..... gallons.....	16,552,000
Minimum night rate..... do.....	12,736,000
Ratio of minimum night rate to mean daily supply..... per cent.....	42
Per capita consumption (resident population)..... gallons.....	
Subdivision survey:	
Started, November 1, 1915.	
Finished, April 13, 1916.	
Cost.....	\$3,480.90

Population:

Resident—

Metered.....	24,380
Unmetered.....	2,668
Total.....	27,048

Floating—

Metered.....	9,167
Unmetered.....	675
Total.....	9,842

¹ Districts I and K were measured together.

Buildings:

Dwellings—

Metered.....	3,414
Unmetered.....	485

Hotels and apartments—

Metered.....	97
Unmetered.....	2

Restaurants—

Metered.....	12
Unmetered.....	0

Factories—

Metered.....	0
Unmetered.....	0

Municipal buildings—

Metered.....	13
Unmetered.....	3

Federal buildings—

Metered.....	1
Unmetered.....	0

Miscellaneous—

Metered.....	821
Unmetered.....	124

Total—

Metered.....	4,358
Unmetered.....	614

Total night flow detected by subdivision tests, per day.....gallons.. 1,152,390

Due to flow inside metered premises.....do..... 714,500

Due to flow inside unmetered premises.....do..... 157,600

Due to underground leakage—

Services.....do..... 125,850

Mains.....do..... 72,600

Unclassified.....do..... 1,800

Total.....do..... 200,250

Due to municipal consumption.....do..... 48,220

Due to Federal consumption.....do..... 0

Total flow accounted for.....do..... 1,120,570

Total flow unaccounted for.....do..... 31,820

STATEMENT NO. 5F.—*Pitometer district L, survey No. 4.*

Measurement, October 4–11, 1915.

Mean daily supply.....gallons.. 4,176,000

Minimum night rate.....do..... 3,264,000

Ratio of minimum night rate to mean daily supply.....per cent.. 78

Per capita consumption (resident population).....gallons.. 114

Subdivision survey:

Started, March 16, 1916.

Finished, July 6, 1916.

Cost.....\$2,844.89

Population:

Resident—

Metered.....36,212

Unmetered.....582

Total.....36,794

Floating—

Metered.....10,768

Unmetered.....92

Total.....10,660

Buildings:

Dwellings—		
Metered.....	7,081	
Unmetered.....	179	
Hotels and apartments—		
Metered.....	47	
Unmetered.....	0	
Restaurants—		
Metered.....	15	
Unmetered.....	0	
Factories—		
Metered.....	5	
Unmetered.....	0	
Municipal buildings—		
Metered.....	20	
Unmetered.....	1	
Federal buildings—		
Metered.....	0	
Unmetered.....	0	
Miscellaneous—		
Metered.....	920	
Unmetered.....	64	
Total—		
Metered.....	8,088	
Unmetered.....	244	
Total night flow detected by subdivision tests per day.....	gallons..	2,225,200
Due to flow inside metered premises.....	do.....	1,977,100
Due to flow inside unmetered premises.....	do.....	44,200
Due to underground leakage—		
Services.....	do.....	81,700
Mains.....	do.....	35,100
Unclassified.....	do.....	8,600
Total.....	do.....	125,400
Due to municipal consumption.....	do.....	51,100
Due to Federal consumption.....	do.....	0
Total flow accounted for.....	do.....	2,197,800
Total flow unaccounted for.....	do.....	27,400

STATEMENT NO. 5G—*Pitometer district, Reno, miscellaneous.*

No measurement made.

Subdivision survey:

Started, July 26, 1915.

Finished, September 19, 1915.

Cost..... \$1,546.05

Population:

Resident—

Metered.....	10,644
Unmetered.....	908

Total.....	11,552
------------	--------

Floating—

Metered.....	1,976
Unmetered.....	367

Total.....	2,343
------------	-------

Buildings:

Dwellings—

Metered.....	2,569
Unmetered.....	16
Total.....	2,585

Hotels and apartments—

Metered.....	4
Unmetered.....	0
Total.....	4

Restaurants—

Metered.....	1
Unmetered.....	0
Total.....	1

Factories—

Metered.....	0
Unmetered.....	0
Total.....	0

Municipal buildings—

Metered.....	9
Unmetered.....	0
Total.....	9

Federal buildings—

Metered.....	1
Unmetered.....	1
Total.....	2

Miscellaneous—

Metered.....	80
Unmetered.....	11
Total.....	91

Total—

Metered.....	2,664
Unmetered.....	28

Total night flow detected by subdivision tests, per day.....gallons.. 981,200

Due to flow inside metered premises.....do... 177,900

Due to flow inside unmetered premises.....do... 0

Due to underground leakage—

Services.....do...	6,700
Mains.....do...	40,500
Unclassified.....do...	0

Total.....do... 47,200

Due to municipal consumption.....do... 328,600

Due to Federal consumption.....do... 250,900

Total flow accounted for.....do... 804,600

Total flow unaccounted for.....do... 176,600

STATEMENT No. 5H.—*Pitometer District F, miscellaneous.*

No measurement made.	
Subdivision survey:	
Started June 11, 1916.	
Finished June 30, 1916.	
Cost.....	\$517.91
Population:	
Resident—	
Metered.....	1,815
Unmetered.....	305
Total.....	2,120
Floating—	
Metered.....	12
Unmetered.....	5
Total.....	17
Buildings:	
Dwellings—	
Metered.....	305
Unmetered.....	112
Hotels and apartments—	
Metered.....	1
Unmetered.....	0
Restaurants—	
Metered.....	0
Unmetered.....	0
Factories.....	
Metered.....	0
Unmetered.....	0
Municipal buildings—	
Metered.....	0
Unmetered.....	0
Federal buildings—	
Metered.....	0
Unmetered.....	0
Miscellaneous—	
Metered.....	18
Unmetered.....	9
Total—	
Metered.....	324
Unmetered.....	121
Total night flow detected by subdivision tests, per day.....	
Due to flow inside metered premises.....	84,200
Due to flow inside unmetered premises.....	50,700
Due to flow inside unmetered premises.....	0
Due to underground leakage—	
Services.....	22,700
Mains.....	6,900
Unclassified.....	0
Total.....	29,600
Due to municipal consumption.....	0
Due to Federal consumption.....	0
Total flow accounted for.....	80,300
Total flow unaccounted for.....	3,900

ACCOUNTING AND STORES.

SIR: The following is a summary of the work done by this division for the fiscal year ended June 30, 1916. There has been considerable of an increase in this branch of the department since the last report.

ACCOUNTS.

The expense account and other tables showing in detail the cost of operating this branch of the department are submitted.

In all, 748 separate accounts were opened during the year and the following miscellaneous office work performed:

Vouchers passed.....	2,419
Requisitions made.....	724
Letters mailed.....	1,100
Cards mailed.....	56
Official letters written.....	845
Work orders issued.....	2,259
Files received and forwarded.....	1,489
Pay rolls made.....	1,168
Miscellaneous papers handled.....	53,610
Records made on cards.....	1,707
Letters filed.....	3,346
Transfer vouchers made.....	809
Total.....	69,532

An increase over the previous year of 3,298 papers handled.

STOREKEEPING.

The work of this branch has been kept up to its standard during the year, under the supervision of the stores clerk, Mr. Robertson, whose report follows:

The value of material issued during the year was \$254,945.05 and of material received \$255,174.17.

The values of monthly receipts and issues of material were as follows:

Month.	Received.	Issued.
July, 1915.....	\$12,852.01	\$21,747.71
August.....	12,065.67	18,502.62
September.....	22,456.46	21,150.03
October.....	24,931.94	24,450.47
November.....	21,013.53	20,758.79
December.....	21,052.29	19,216.89
January, 1916.....	20,874.73	18,292.92
February.....	25,082.34	16,772.15
March.....	21,160.32	21,551.95
April.....	21,976.86	19,796.66
May.....	14,981.13	23,935.58
June.....	36,726.89	25,769.28
Total.....	255,174.17	254,945.05

The value of tools and equipment received was \$23,461.61 and disposed of by transfer, etc., \$30,379.82.

At the close of business, June 30, 1916, the value of material in stock was \$142,212.70 and of tools and equipment in use and in storerooms, \$646,240.66.

Total accountability of subdivision on June 30, 1916, was \$788,453.36.

Cost of operating storeroom for the fiscal year 1916 was 4.64 per cent of the value of material issued and tools and equipment disposed of—a decrease of 0.36 per cent from cost of 1915. Large quantities of tools and equipment were issued to various branches of the department, the value of which was not used in arriving at the percentage of cost.

During the year there was recovered from scrap pile lead and brass as follows:

Material.	Quantity.	Value.
Lead..... pounds..	815	\$48.90
Brass..... do.....	5,590.5	559.05
		607.95

STATEMENT NO. 5H.—*Pitometer District F, miscellaneous.*

No measurement made.	
Subdivision survey:	
Started June 11, 1916.	
Finished June 30, 1916.	
Cost.....	\$517.91
Population:	
Resident—	
Metered.....	1,815
Unmetered.....	305
Total.....	2,120
Floating—	
Metered.....	12
Unmetered.....	5
Total.....	17
Buildings:	
Dwellings—	
Metered.....	305
Unmetered.....	112
Hotels and apartments—	
Metered.....	1
Unmetered.....	0
Restaurants—	
Metered.....	0
Unmetered.....	0
Factories.....	
Metered.....	0
Unmetered.....	0
Municipal buildings—	
Metered.....	0
Unmetered.....	0
Federal buildings—	
Metered.....	0
Unmetered.....	0
Miscellaneous—	
Metered.....	18
Unmetered.....	9
Total—	
Metered.....	324
Unmetered.....	121
Total night flow detected by subdivision tests, per day.....	
Due to flow inside metered premises.....	84,200
Due to flow inside unmetered premises.....	50,700
Due to underground leakage—	0
Services.....	22,700
Mains.....	6,900
Unclassified.....	0
Total.....	
Due to municipal consumption.....	29,600
Due to Federal consumption.....	0
Total flow accounted for.....	0
Total flow unaccounted for.....	80,300
	3,900

ACCOUNTING AND STORES.

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Pay rolls made.....	1,168
Miscellaneous papers handled.....	53,610
Records made on cards.....	1,707
Letters filed.....	3,346
Transfer vouchers made.....	809

Total..... 69,532

An increase over the previous year of 3,298 papers handled.

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The work of this branch has been kept up to its standard during the year, under the supervision of the stores clerk, Mr. Robertson, whose report follows:

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Month.	Received.	Issued.
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August.....	12,065.67	18,502.62
September.....	22,456.46	24,150.03
October.....	24,931.94	24,450.47
November.....	21,013.53	20,758.79
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February.....	25,082.34	16,772.15
March.....	21,160.32	21,551.95
April.....	21,976.86	19,796.66
May.....	14,981.13	23,935.58
June.....	36,726.89	25,769.28
Total.....	255,174.17	254,945.05

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At the close of business, June 30, 1916, the value of material in stock was \$142,212.70 and of tools and equipment in use and in storerooms, \$646,240.66.

Total accountability of subdivision on June 30, 1916, was \$788,453.36.

Cost of operating storeroom for the fiscal year 1916 was 4.64 per cent of the value of material issued and tools and equipment disposed of—a decrease of 0.36 per cent from cost of 1915. Large quantities of tools and equipment were issued to various branches of the department, the value of which was not used in arriving at the percentage of cost.

During the year there was recovered from scrap pile lead and brass as follows:

Material.	Quantity.	Value.
Lead.....pounds..	815	\$48.90
Brass.....do.....	5,590.5	559.05
		607.95

During the year there was collected, broken up, weighed, and delivered to contractor the following old materials:

Material.	Quantity.	Value.
Cast iron.....pounds..	441,084	\$1,514.74
Wrought iron.....do..	29,655	103.79
Barrels.....do..	105	70.89
Lead cross.....pounds..	10,392	233.82
Rubber hose, matting, tires, etc.....do..	5,115	112.47
Rope, manila.....do..	732	14.64
		2,050.35

MISCELLANEOUS WORK PERFORMED.

There were prepared and forwarded to the superintendent 131 requisitions for material, etc., weekly reports showing quantity of pipe and fittings on hand and work performed, daily statement of value of material, tools and equipment received and issued, value of material on hand, and tools and equipment in use in storerooms.

Semiannual reports of property received, issued, and transferred were made in January and April.

Sixty-two personal tool and equipment accounts were checked.

Five hundred and thirty-four sick and injured employees were given treatment from first-aid cabinet by employees of this subdivision.

During the year a number of visitors representing out-of-town water departments and visitors representing other branches of the District government inspected the storeroom and methods employed to keep account of tools and material.

The work accomplished by this division during the year is due to the faithful and efficient service of the employees.

W. C. SMALL,
Clerk in charge.

To the SUPERINTENDENT, WATER DEPARTMENT.

TABLE I.—Statement of cash account of the water fund, District of Columbia, including outstanding obligations and appropriations, for the fiscal year ended June 30, 1916, as shown by the books of the auditor of the District of Columbia.

Balances July 1, 1915:		
Cash in Treasury of the United States.....	\$138,247.93	
Cash in hands of disbursing officer, District of Columbia.....	4,903.36	
		\$143,151.29
Receipts for year:		
Water rents.....	624,882.18	
Taps and stopcocks.....	7,020.80	
Water-main assessment collections—		
Principal.....	60,007.08	
Interest on deferred payments.....	4,640.72	
Sale of old materials.....	1,761.39	
		698,312.17
Repayments for year:		
Cash—		
High service, 1916.....	2,178.63	
High service, 1915.....	1,843.92	
Salaries, revenue and inspection branch, 1916.....	41.66	
Salaries, distribution branch, 1915.....	32.55	
General expenses, 1916.....	11.25	
General expenses, 1915.....	27.00	
Transfer vouchers—		
High service, 1916.....	17,325.36	
High service, 1915.....	1,791.05	
General expenses, 1916.....	313.07	
General expenses, 1915.....	1,081.62	
Salaries, distribution branch, 1916.....	23.65	
		24,669.76
		866,133.22

Expenditures for year:

Appropriation water department, District of Columbia,

1916—

Salaries, revenue and inspection branch.....	\$31,997.22	
Salaries, distribution branch.....	55,111.95	
Contingent expenses.....	3,809.69	
General expenses.....	29,044.14	
High service.....	429,769.29	
Refunds.....	1,615.52	
Reimbursement to the United States on account of appropriation for the extension of water mains...	19,967.21	
		<u>\$571,315.02</u>

Appropriation water department, District of Columbia,

1915—

Contingent expenses.....	377.47	
General expenses.....	5,294.92	
High service.....	40,703.04	
		<u>46,375.43</u>

Total cash expenditures for year..... 617,690.45

Balances, June 30, 1916:

Cash in Treasury of the United States.....	245,372.97	
Cash in hands of disbursing officer, District of Columbia.....	3,069.80	
		<u>248,442.77</u>
		<u>866,133.22</u>

Resources:

June 30, 1916, cash balances to credit of water fund as above.....	248,442.77	
Add amount of transfer credits due for work done by water department during 1916 not yet received by auditor.....	1,526.56	
		<u>249,969.33</u>

Liabilities:

Unexpended balances of water department appropriations for fiscal years—

1916.....	9,581.73	
1915.....	3,394.76	
Outstanding liabilities account appropriation for high service, 1916.....	191,854.98	
Leaves balance available for appropriation, carried forward, to 1917 account.....	¹ 45,137.86	
		<u>249,969.33</u>

¹ This balance should be reduced by \$30,000 when consideration is given to the fact that completion of construction work ordered by the commissioners will require the expenditure of the above amount for labor on account of 20-inch main from Georgia Avenue and Fairmont Street to Woodley Road and Wisconsin Avenue NW.

TABLE II.—Cost of work done by the water department for the year ending June 30, 1916.

Heads of expenditures.	Per diem and salaries.	Material expended, cuts, and transportation.	Total expenditures.	Charge to general account.				Stables accounts, I. F.
				New work.	Operating expenses.	General repairs.	Replacement of old work.	
Water surveys (detection of leaks).....	\$29,079.75	\$5,131.02	\$34,210.77	\$2,045.52	\$32,165.25			
Installation and maintenance of meters.....	32,327.93	62,122.75	94,450.68	76,508.94	18,241.74			
Office of water registrar.....	55,088.22	5,397.19	60,485.41		60,485.41			
Inspection and repair of services.....	28,472.15	3,179.23	31,651.38			\$31,651.38		
New services installed.....	3,477.10	2,049.15	5,526.25		5,526.25			
Tapping water mains.....	3,229.26	3,773.57	7,002.83		7,002.83			
Engineering.....	29,601.96	1,840.19	31,442.15		14,941.65			
Stable and hauling account.....	26,884.81	10,439.28	37,324.09					
Operation and repairs of valves, fire hydrants, etc.....	26,884.81	10,439.28	37,324.09					
New street hydrants and fountains erected.....	26,884.81	10,439.28	37,324.09					
Water mains.....	27,396.97	58,451.05	85,848.02					
Repairs to leaks.....	14,831.10	5,088.24	19,919.34					
Reservoirs, lodges, and towers.....	8,048.96	1,502.78	9,551.74					
Care of grounds.....	6,384.76	10,069.93	16,454.69					
Repayment and deposit work.....	11,290.01	24,517.36	35,777.37					
Plans, estimates, and tests.....	17,267.38	605.29	17,872.67					
Care of District pumping station.....	14,951.18	3,120.06	18,071.24					
Operating and repairs of pumps, Bryant Street station.....	26,613.91	28,391.94	54,975.85					
Operating and repairs of pumps, Reno.....	1,838.05	773.69	2,611.74					
Operating and repairs of pumps, Anacostia.....	3,277.12	1,045.02	4,322.14					
New pumping equipment.....	150.61	33,256.82	33,407.43					
Shop work.....	21,137.20	12,748.34	33,885.54					
New buildings.....	1,461.84	1,508.39	2,970.23					
Furnished other District of Columbia offices.....	7,049.43	2,736.87	9,786.30					
Gross expenditures.....	\$85,911.49	308,505.35	694,416.84	276,914.67	261,544.52	83,856.19	35,777.37	36,324.09

SUMMARY.

Expenditures:	Charged to—		Per cent.
	Per diem pay rolls.....	New work.....	
Salary pay rolls.....	\$298,807.31	Operating expenses.....	\$276,914.67
Total services.....	385,911.49	General repairs.....	83,856.19
Material expended, cuts, etc.....	308,505.35	Replacement work.....	35,777.37
Gross expenditures.....	694,416.84		
Less transportation credit.....	36,324.09		
Net expenditures.....	658,092.75		100.0

TABLE III.—Statement of the distribution system, including mains laid by the United States, the District of Columbia, and on account of repayment work.

	In service June 30, 1915.	Laid during year ended June 30, 1916.	Abandoned during year ended June 30, 1916.	In service June 30, 1916.
Diameter:				
3-inch.....linear feet..	79,988	825	124	80,689
4-inch.....do.....	152,527	1,450	1,559	152,418
6-inch.....do.....	1,471,548	2,983	1,906	1,472,625
8-inch.....do.....	791,006	38,630	2,007	827,569
10-inch.....do.....	9,109			9,109
12-inch.....do.....	363,211	8,364	60	371,515
16-inch.....do.....	17,564	302		17,866
20-inch.....do.....	98,868	1,560	367	100,061
24-inch.....do.....	26,408			26,408
30-inch.....do.....	57,995			57,995
36-inch.....do.....	59,437			59,437
42-inch.....do.....	23			23
48-inch.....do.....	44,172			44,172
75-inch.....do.....	600			600
Total.....	3,172,456	54,114	6,083	3,220,487
Stop valves.....	9,654	565	190	10,029
Fire hydrants.....	3,374	253	183	3,444
Public hydrants.....	217	5	4	218
Sanitary fountains.....	13	4	1	16
Horse fountains.....	152	1		153
Public wells (deep).....	44			44
Public wells (shallow).....	9			9

TABLE IV.—Statement of the length and cost of water mains laid from July 1, 1878, to June 30, 1916, paid from water department funds.

	In service June 30, 1915.	Laid during year ended June 30, 1916.	Abandoned during year ended June 30, 1916.	In service June 30, 1916.
Diameter:				
3-inch.....linear feet..	77,052	36		77,088
4-inch.....do.....	117,434	482	1,499	116,417
6-inch.....do.....	1,083,192	2,417	1,426	1,084,183
8-inch.....do.....	738,373	37,874	843	775,404
10-inch.....do.....	6,741			6,741
12-inch.....do.....	323,546	8,295	57	331,784
16-inch.....do.....	17,638	302		17,940
20-inch.....do.....	88,798	1,200		89,998
24-inch.....do.....	14,494			14,494
30-inch.....do.....	20,437			20,437
36-inch.....do.....	38,248			38,248
42-inch.....do.....	23			23
48-inch.....do.....	14,309			14,309
Total.....	2,540,285	50,606	3,825	2,587,066

Total cost to June 30, 1915..... \$3,686,834.55
 Total cost for year ended June 30, 1916..... 85,848.02

Aggregate cost to June 30, 1916..... 3,772,682.57

TABLE V.—Statement of the average cost per foot for laying water mains for the year ended June 30, 1916.

Character of pavement cut.	Size of pipe.	Cost for labor per linear foot.	Cost for material, cuts to pavements, etc., per linear foot.	Total cost per linear foot laid.
	<i>Inches.</i>			
Sheet asphalt.....	3	\$0.872	\$0.515	\$1.387
Sheet asphalt.....	4	.595	.808	1.403
Macadam.....	4	.482	1.222	1.704
Cement.....	6	.616	.933	1.549
Sheet asphalt.....	8	.565	1.281	1.846
Macadam.....	8	.424	.846	1.270
Unimproved.....	8	.352	.809	1.161
Macadam.....	12	.461	1.228	1.689
Unimproved.....	12	.352	1.147	1.499
Sheet asphalt.....	16	.808	2.668	3.536

NOTE.—Excessive cost of 3 and 4 inch main due to pipe being laid in short sections in alleys and house connections.

REPORT OF THE WATER REGISTRAR.

OCTOBER 3, 1916.

SIR: I have the honor to submit the annual report of the revenue and inspection branch of the water department, showing in detail the work accomplished during the fiscal year ended June 30, 1916.

INSTALLATION OF METERS.

The work during the year consisted in metering that portion of the first high service embraced in the territory between Twenty-third Street and Rock Creek, L Street and Florida Avenue NW.; E Street and Florida Avenue, North Capitol and Thirteenth Streets NE.; Fifth and Nineteenth, East Capitol and E Steets SE. Meters were also installed in areas previously covered where new houses have since been erected.

In the installation this year quite a number of private services were encountered, and, being of wrought iron and in a bad condition from long use and corrosion, it was necessary to disconnect the premises supplied through them and connect direct to the water main.

In all cases, as heretofore, where a curb cock or box was missing a new one was installed.

The number of meters installed during the year was 5,880 and the number discontinued was 308, making a total now in use 53,983.

The following shows the average cost of installing a meter:

Meter.....	\$5.00
Material.....	3.37
Labor.....	2.90
Total.....	11.27

The following shows the average force engaged:

In charge, master plumber (half time ¹).....	1	Laborers.....	13
Plumber.....	1	2-horse team.....	1

The following additional work was performed in connection with the installation of meters: Adjusting meter pits to grade; removing meters for test, etc.; setting temporary meters, etc. This work was handled by the following force:

In charge, master plumber (half time ¹).....	1	Laborers.....	2
Plumbers.....	2	1-horse wagons.....	2

In addition to the above, such assistance as may be necessary from time to time is given by the different forces engaged on other work when this class of work becomes heavy.

¹ As this man also has charge of taking out meters for test and repairs, etc., only half of his time is properly charged to installation.

LEAKS AND WASTES.

During the year 36,732 examinations for leaks were made; this included ordinary leaks at house fixtures and the more complicated cases of underground leaks, the detection of which required considerable time and the employment of experienced men.

In all, 413 water services were disconnected at the tap in the main; of this number 264 formerly served houses that have been torn down; the remainder were installed many years ago and in a large number of cases never used. This latter class of services has caused considerable trouble in the past, owing to the fact that in some cases there was either no data as to their installation or the location was so indefinite as to be practically useless. Leaks from this source were difficult to locate.

The water supply was cut off from 6,394 houses this year during the period of vacancy which has resulted in the saving of considerable water and has prevented the reoccupying of these houses without the knowledge of the office, thereby insuring full payment for the time water was used.

During the year 4,850 taps and curb cocks were located. This work was done in advance of the meter installation, thereby rendering it unnecessary to defer the installation of a meter on account of the indefinite location of the service. For this purpose the Grove electric indicator was used. This instrument was employed during the year in 1,174 cases.

The subdivision engaged on leaks and wastes also performed the following work: New curb cocks installed or old ones repaired 164; 28 services repaired; 49 street washers repaired, replaced, or removed; 15 pressure regulators installed or repaired; 9 services lowered to grade; 50 private services disconnected; and 166 houses connected direct to mains. They also assisted from time to time in the removal of meters for repair and test and replacing them with others. Some of the old services abandoned formerly supplied two or more houses, which accounts for the difference in the number of services.

SERVICE CONNECTIONS.

There were 1,545 new service connections made, inspected, and locations recorded during the year; also 746 repairs, etc., to water services and appurtenances were inspected and recorded.

This work has been handled by the regular inspector with some assistance from the office force, and inspections have been made in the majority of cases within one hour of the time specified by the plumber doing the work.

Owing to the reduction in the number of new service connections, the tapper and assistant tapper have been used in connection with leaks and wastes and the taking out and replacing of meters, thus keeping these branches of the work up to date. This detail did not occasion any loss of time in connection with the tapping of water mains, and saved the employment of more men in the subdivision to which the assistance was given.

REVENUES.

The table of comparative revenues shows a total collection of \$722,981.93.

There has been a drop in the revenues for water rents this year, which is partly attributable to the decrease in building operations and the consequent lessening of the number of new services installed, and also to the change in the charge for water from the flat rate to the meter rate, a loss which was fully anticipated. From this it will be seen that meters have proved of considerable benefit to the consumers in general from a financial point of view, and their installation has been of the greatest value to the District of Columbia in cutting down the waste of water.

Table 1 shows statement of collections and expenditures.

Table 2 shows comparative statement of revenues.

Table 3 shows number of meters in service.

Table 4 shows general information.

WATER RATES.

There has been no change in water rates during the past year. The rate for domestic purposes is charged according to stories and front feet. On all tenements two stories high with a frontage of 16 feet or less, \$5 per annum; for each additional front foot or fraction thereof greater than one-half, 31 cents; for each additional story or part thereof, one-third of the charges as computed above.

Business premises are rated according to their size, class, volume of business, and water facilities, and rate from \$1 to \$25. If the flat rate on business establishments

reaches \$25 or more, the owner or occupant is required to install a water meter at his own expense.

Meter rates.—A minimum rate of \$4.50 is charged against all consumers supplied with water through meters, which allows the use of 7,500 cubic feet of water during the fiscal year, water used in excess of this quantity being charged for at the rate of 4 cents per 100 cubic feet.

CONDITION OF THE WORK.

Notwithstanding the fact that there has been a large increase in business over that of previous years, owing to the change from the flat rate to the meter system, the condition was met without any addition to the force and the work was up to date at the close of the year.

This result was obtained by the faithful cooperation of the employees, for which I now take pleasure in expressing my appreciation.

Very respectfully,

GEO. W. WALLACE,
Water Registrar.

The SUPERINTENDENT, WATER DEPARTMENT.

TABLE 1.—Statement of collections and expenditures.

Water rents:		
Flat rate.....	\$138,624.30	
Meters.....	482,605.92	
Building purposes.....	3,651.96	
		624,882.18
Water-main tax, principal and interest.....	\$64,647.80	
Taps and stopcocks.....	7,020.80	
Miscellaneous receipts.....	1,761.39	
		73,429.99
Total receipts.....		698,312.17
Repayments, deposits, and special appropriations.....		24,669.76
Total receipts and repayments.....		722,981.93

TABLE 2.—Statement of cash receipts and expenditures of the water fund, District of Columbia, for the fiscal years from June 30, 1903, to June 30, 1916.

Year.	Water rents.	Water-main tax, principal and interest on same.	Taps and stopcocks.	Miscellaneous receipts.	Repayments, deposits, and special appropriations.	Total receipts and repayments, balance brought forward.	Receipts and repayments, including balance brought forward from year to year.	Expenditures.
1903.....						\$341,337.37		
1904.....	\$341,947.53	\$51,713.64	\$6,522.67	\$845.26	\$16,074.20	417,123.30	\$758,460.67	\$708,105.58
1905.....	352,156.93	32,217.84	8,603.80	2,819.95	27,652.40	423,450.98	473,806.07	437,211.26
1906.....	362,261.54	34,395.76	9,100.00	23.60	25,187.61	430,973.51	467,568.32	435,061.44
1907.....	468,889.47	51,319.62	9,487.10	6,254.73	19,912.51	553,863.43	587,770.31	530,379.39
1908.....	479,981.22	57,462.39	8,688.10	1,376.24	47,984.35	595,092.30	652,883.32	609,240.76
1909.....	502,894.45	57,654.06	10,674.15	1,530.08	49,875.59	622,628.33	686,270.89	652,592.33
1910.....	509,769.23	76,905.15	11,794.78	1,715.20	26,498.58	626,682.94	710,361.50	626,243.69
1911.....	521,581.78	101,987.53	8,824.35	960.04	94,520.49	727,974.19	818,092.00	730,893.58
1912.....	545,405.47	122,458.81	11,438.65	2,817.50	110,441.39	792,561.82	879,760.24	769,530.18
1913.....	640,008.64	138,693.75	8,685.50	3,153.81	14,923.91	805,465.61	915,695.67	854,477.38
1914.....	646,286.15	86,379.21	6,118.20	4,253.20	24,131.64	767,178.40	828,396.69	791,952.16
1915.....	638,801.89	66,107.56	6,559.89	3,532.77	11,513.50	729,575.61	763,020.14	619,868.85
1916.....	624,882.18	64,647.80	7,020.80	1,761.39	24,669.76	722,981.93	806,133.22	617,690.45
1917.....	6,434,911.48	941,943.12	113,517.93	32,063.77	481,872.59	7,829,714.21		7,690,978.20
1918.....	610,000.00	65,000.00	6,000.00	2,000.00		2 683,000.00		
	600,000.00	65,000.00	6,000.00	2,000.00		2 673,000.00		

¹ Estimated.

² Estimated total revenue.

TABLE 3.—*Water meters.*

Name.	$\frac{1}{2}$ -inch.	$\frac{3}{4}$ -inch.	1-inch.	1 $\frac{1}{2}$ -inch.	2-inch.	3-inch.	4-inch.	6-inch.	8-inch.	Total.
American.....	159	3	10	4						176
American, new model.....	73									73
Crown.....	2	12	33	25	10	8		2		92
Empire.....	49	11	8	1	3	2	1			75
Enare.....		18	19	29	10					76
Eureka.....							1			1
Gamon.....	38									38
Gem.....					23	15	8	1		47
Hersey Disc.....		548	45	94	26	13	2	1		729
Hersey, model F.....	23,314									23,314
Hersey, Torrent.....						2				2
Hersey, Detector.....						6	6	9	3	24
Keystone (Pittsburgh Disc).....		42	43	30	21	25	3			164
Keystone, model W.....	12,661									12,661
King.....	171	1	3	6	1					182
Lambert.....	1,222	162	136	107	61	16	7	1		1,712
Lambert Special.....	487									487
Nash.....	129	382	554	273	122	41	12	1		1,514
Niagara.....	2	62	55	71	37	1				228
Standard.....	11			4						4
Thomson.....		11	29	36	23	1	1			102
Trident Disc.....	2,580	71	116	100	29	2				2,898
Trident Crest.....					2	7	14	1		24
Trident Compound.....						3	1			16
Union.....		3	7	4	1					16
Worthington.....	237	48	55	31	21	14	5			411
Worthington, model D.....	50									50
Worthington, model G (old).....	90									90
Worthington, model G (new).....	4,932									4,932
Worthington, model K.....	3,852									3,852
Total.....	50,049	1,374	1,113	815	390	156	62	16	3	53,978
Registers.....										5
Total meters and registers.....										53,983

¹ One $\frac{1}{2}$ -inch meter.TABLE 4.—*General information.*

Average cost of installing a water meter by the department:

Meter.....	\$5.00
Material.....	3.37
Labor.....	2.90

\$11.27

Cost of labor and material for maintenance of meters.....

18,593.64

Average cost per meter for maintenance.....

.33

Consumption of water through meters:

District meters.....	cubic feet..	403,709,400
District meters in municipal buildings.....	cubic feet..	61,573,100
Private meters.....	cubic feet..	563,795,600
Private meters in charitable institutions.....	cubic feet..	26,638,900

1,055,717,000

Meters in service.	In use June 30, 1915.	Installed, 1916.	Abandoned, 1916.	Total in use June 30, 1916.
District meters.....	44,843	5,769	124	50,488
District meters in municipal buildings.....	255	4	6	253
Private meters.....	3,137	98	174	3,061
Private meters in charitable institutions.....	176	9	4	181
Total.....	48,411	5,880	308	53,983

Average cost of reading meters.....	\$0.12
Average cost of computing and making bills.....	.12
Average payment for premises in which meters were installed.....	5.48
Average payment for flat rate accounts.....	6.44
Difference.....	.96
Revenue:	
For metered water—	
District of Columbia meters.....	\$245,853.47
Private meters.....	236,752.45
	482,605.92
For flat-rate accounts—	
Water rents.....	138,624.30
Building purposes.....	3,651.96
	142,276.26
Total revenues for the fiscal year 1916.....	624,882.18
Water services:	
In use June 30, 1915.....	68,365
Installed, 1916.....	1,545
	69,910
Abandoned, 1916.....	149
	69,761
Water services in use June 30, 1916.....	69,761
Water services metered.....	53,965
Water services not metered.....	15,796
Percentage of services metered.....	77

REPORT OF THE SUPERINTENDENT OF SEWERS.

WASHINGTON, D. C., *October 2, 1916.*

SIR: I have the honor to submit the following report of the sewer division, engineer department, District of Columbia, for the fiscal year ending June 30, 1916.

DIVISION A.—DRAINAGE STUDIES, PLANS, ENGINEERING DATA.

Studies for the future development of the sewerage system, for new trunk lines as well as important extensions, included during the year the following: For sanitary drainage and separate system sewerage, detailed plans were prepared for drainage works in Falls Branch Valley, including outlet for same from the northern boundary of the Dalecarlia Reservoir to the Chain Bridge, where connection will be made to the Upper Potomac interceptor; also sanitary sewers and outlet system for Chevy Chase grove, Pinchurst, and other large areas north of Broad Branch bordering Rock Creek Park; also sanitary sewers for developing areas in the northerly part of Petworth; sanitary sewers and outlets for Kenilworth, Hillbrook, and Benning areas, extending to the easterly boundary of the District.

Storm drainage studies were developed for new areas in the vicinity of Cleveland Park, Chevy Chase, Petworth, Brightwood, in the Anacostia River Valley, and for the Piney Branch Valley between Georgia Avenue and the District line. Detail plans also were prepared for extensions of the Petworth, Upshur Street, Kingle Road, and Connecticut Avenue Heights trunk sewers, also for the main drainage works along the east side of the Anacostia River Valley, including storm-water outlets at Scaggs Branch, Popes Run, Smiths Branch, Elys Run, and Blaine Street.

Detail plans and estimates were prepared for a new drainage sewerage system for the lower James Creek Valley in the vicinity of the Army War College, providing for storm and sanitary drainage, and for the protection of the depressed portion of this area now subject to flooding. It is considered highly important in the interest of proper sanitation, as well as protection from flooding, that the construction recommended be authorized regardless of the matter of abandoning and filling the canal below P street.

Plans were also prepared for trunk sewers in Fourteenth Street NW., between H and K Streets; Seventeenth Street NW., between New York Avenue and D Street; Pennsylvania Avenue NW., between Second and Third Streets, as well as for concrete invert in old Tiber sewer from Pennsylvania Avenue southward.

For the sewage-disposal system, plans were prepared for the Anacostia main interceptor to Bennings and for the Rock Creek main interceptor to Military Road.

The year's work included study for locations of steam tunnels and conduits of the United States Central Heating, Lighting, and Power Plant, including changes in existing underground structures to permit this construction.

During the year the records of operating and mechanical plants have been analyzed and results tabulated, and the comparative study of unit costs both of construction and operation continued.

The engineering record for the year included rainfall, run-off, and river-flow data, bacteriological examinations and a sanitary study of stream conditions, as well as determination of the oxygen content of river waters throughout the year.

RAINFALL AND RUN-OFF.

Data for run-off studies included rainfall records from 3 automatic recording and 21 ordinary gauges, distributed over 50 square miles of area, as well as discharge and flow-line determinations for excessive storms in a number of the main drainage lines.

The storm of greatest intensity for the year occurred on June 10, 1916, beginning about 7.10 p. m. and lasting about 35 minutes. During this interval, in the northeast section, 2.08 inches of rain fell in 35 minutes.

The following is the record for this storm, as well as for the other excessive storms of the year:

Tabulation of the total observed rainfall for the three excessive storms of the fiscal year 1916 as recorded at 24 stations.

Station No.	Location.	Radial distance in miles.	Total rainfall.		
			July 19, 1915.	Aug. 8, 1915.	June 10, 1916.
1	Pennsylvania Avenue and Thirteenth Street NW....	0	0.90	0.69	2.92
2	Tenth and G Streets NW.....	.40	.85	.78	2.42
3	Seventeenth and K Streets NW.....	.60	1.05	(¹)	2.50
4	Twenty-fourth and M Streets NW.....	1.20	1.25	.31	2.18
5	Delaware Avenue and C Street NE.....	1.20	1.15	.64	2.15
6	New York Avenue and New Jersey Avenue NW.....	1.20	.88	.62	2.25
7	Seventeenth and U Streets NW.....	1.40	1.75	.55	1.75
8	North Carolina Avenue and Seventh Street SE.....	1.90	1.12	.78	2.85
9	Rock Creek and Massachusetts Avenue NW.....	2.00	1.08	.38	1.25
10	First and O Streets SE.....	2.10	.96	1.07	2.20
11	Dent Place and Thirty-fifth Street NW.....	2.20	1.45	.35	1.50
12	Filtration Plant.....	2.20	1.75	.40	1.52
13	Maryland Avenue and Thirteenth Street NE.....	2.30	.92	.65	2.68
14	Zoological Park.....	2.40	1.85	.60	1.30
15	Park Road and Holmead Place NW.....	2.40	1.35	.50	1.32
16	Twenty-first and A Streets NE.....	3.00	.72	.62	2.55
17	Fourteenth and V Streets SE.....	3.00	2.38	1.12	1.50
18	Twelfth and Monroe Streets NE.....	3.30	1.35	.50	1.38
19	Fourth Street and Nichols Avenue SE.....	3.90	1.90	.38	1.25
20	Nebraska Avenue and Tunlaw Road.....	4.20	1.75	.98	.90
21	Georgia Avenue and Nicholson Street NW.....	4.40	(¹)	.92	1.00
22	Minnesota Avenue and Gault Place NE.....	4.70	.25	.75	3.70
23	Conduit Road and Little Falls Road.....	5.10	1.78	1.00	.91
24	Great Falls, Md.....	16.00	.80	.16	.75

¹ No record.

Excessive storm of June 10, 1916.

DEPTH OF PRECIPITATION.

[Depth in inches at time indicated.]

Gauge.	7.10	7.15	7.20	7.25	7.30	7.35	7.40	7.45
No. 4, Twenty-fourth and M Streets NW.....	0.27	0.59	0.81	1.11	1.38	1.61		
No. 10, First and O Streets SE.....	0	.20	.58	1.15	1.44	1.75	1.84	1.89
No. 16, Twenty-first and A Streets NE.....	0	.10	.20	.45	.82	1.25	1.90	2.08

RATE OF PRECIPITATION.

[Rate in inches per hour during periods of time indicated.]

Gauge.	5 min-utes.	10 min-utes.	15 min-utes.	20 min-utes.	25 min-utes.	30 min-utes.	35 min-utes.	40 min-utes.
No. 4, Twenty-fourth and M Streets NW.....	1.62	2.36	2.43	2.66	2.76	2.73		
No. 10, First and O Streets SE.....	0	1.20	1.20	1.80	2.46	3.00	3.80	3.56
No. 16, Twenty-first and A Streets NE.....	0	2.40	3.48	4.60	4.32	4.20	3.68	3.24

MAXIMUM DEPTH OF PRECIPITATION.

[Depth in inches during periods of time indicated.]

Gauge.	5 min-utes.	10 min-utes.	15 min-utes.	20 min-utes.	25 min-utes.	30 min-utes.	35 min-utes.	40 min-utes.
No. 4, Twenty-fourth and M Streets NW.....	0.27	0.59	0.81	1.11	1.38	1.61		
No. 10, First and O Streets SE.....	0	.20	.58	1.15	1.44	1.75	1.84	1.89
No. 16, Twenty-first and A Streets NE.....	0	.10	.20	.45	.82	1.25	1.90	2.08

The precipitation, by months, for the fiscal year was recorded as follows:

1915.	Inches.	1916.	Inches.
July.....	3.21	January.....	1.57
August.....	7.00	February.....	2.86
September.....	1.39	March.....	2.80
October.....	3.72	April.....	2.96
November.....	.93	May.....	2.30
December.....	2.80	June.....	7.53
		Total.....	39.07

RIVER FLOW AND SEWAGE DILUTION.

The main sewage outfalls of the disposal system at Grimes on the Potomac River were under observation throughout the year and the river conditions in the vicinity of the outfalls were subject to careful study. In general the conditions of river waters continued good, the beaches free from deposit, while the examination of the river bottom fails to disclose as yet appreciable evidence of sludge deposits. Altogether, however, the conditions were not so favorable as heretofore and indicate, not only the need for the introduction of finer screens than now in use to remove more thoroughly the visible evidence of sewage discharge, but also the approaching need for the removal of a considerable portion of the organic matter before discharging the sewage into the river. The most striking indication as to the latter is to be found in the noticeable and objectionable odors frequently noticeable over considerable areas in the vicinity of the outfall, observable for the first time during this year. With the increasing volume of sewage these conditions will gradually grow worse unless adequate remedy is applied, and it is greatly to be desired in the interest of proper sanitation

that treatment works be installed before the conditions reach such a stage as to constitute a positive nuisance.

The following is a tabulation of the flow of the Potomac River for each month of the year, together with the average discharge through the outfall. The latter includes considerable storm water, ground water, and stream flow from suburban areas, as well as leaks and wastes of the water-supply system. The actual ratio to river flow is given in this tabulation as well as the ratio of effective dilution obtained:

River flow and sewage dilution.

Month.	River discharge (second feet).			Average pumpage (second- feet).	Ratio to river flow.	Effective dilution.
	Maxi- mum.	Mini- mum.	Mean.			
1915						
July.....	4,312	2,388	3,343	100	1:33	72:1
August.....	25,125	1,550	8,418	101	1:83	181:1
September.....	13,500	3,425	6,668	98	1:68	114:1
October.....	43,000	3,463	8,820	91	1:97	190:1
November.....	9,062	1,638	4,500	88	1:51	97:1
December.....	59,625	3,012	8,332	94	1:88	180:1
1916						
January.....	33,375	7,712	15,285	95	1:161	325:1
February.....	54,250	11,175	19,416	97	1:200	418:1
March.....	152,500	10,550	31,126	88	1:353	671:1
April.....	48,125	12,750	24,892	101	1:245	536:1
May.....	20,750	6,362	9,983	94	1:106	215:1
June.....	61,000	4,700	17,625	104	1:169	380:1

During the past 12 months the river flow has fallen below 1,600 second-feet on 1 day, below 1,800 second-feet on 1 day, and below 2,000 second-feet on 1 day. The minimum flow was 1,550 second-feet, on August 2, 1915, and the maximum flow was 152,500 second-feet, on March 29, 1916. The mean flow for the year was 13,200 second-feet. The minimum flow for the preceding year was 804 second-feet.

TIDAL RANGE.

The automatic recording tide gauge located at the main sewerage pumping station, on the Anacostia River, about $1\frac{1}{2}$ miles above its junction with the Potomac River, indicated the following for the fiscal year: Maximum high water, August 26, 1915, November 22, 1915, December 6, 1915, and February 21, 1916, +3.5 feet, or 2.6 feet above normal; minimum low water, September 27, 1915, -5.0 feet, or 2.8 feet below normal.

The maximum range of tide for each month of the year was as follows:

Maximum monthly range of tides.

1915	Tidal range, in feet.	1916	Tidal range, in feet.
July.....	5.1	January.....	6.4
August.....	7.2	February.....	7.9
September.....	8.4	March.....	5.5
October.....	6.0	April.....	5.3
November.....	6.7	May.....	5.1
December.....	7.6	June.....	5.5

SANITARY SURVEY OF THE POTOMAC RIVER.

The report of the United States Public Health Service on the sanitary condition of the Potomac River, particularly with reference to the discharge of the sewage from the District of Columbia, was published during the year, and affords indisputable evidence that in important respects there is no ground at present for any apprehension that the sanitary condition of the river is such as to be a menace to the public health

by the pollution of the oyster beds in the lower river or otherwise. This thorough study of the Potomac River adequately explains the peculiar natural local conditions favorable to the disposal of sewage by dilution, but it also indicates that there is a limit to the volume of sewage that may be thus disposed, beyond which it must be expected that unfavorable conditions would undoubtedly develop.

During the year dissolved oxygen tests were made to determine the condition of the river waters in the vicinity of the main sewage outfall, as well as similar determinations of samples taken in the upper river for comparison.

The following table gives the maximum, minimum, and mean results of these oxygen tests:

Comparative oxygen tests of samples of Potomac River water taken near sewage outfall and from the upper river for the fiscal year 1916.

Month.	Average river flow.	Oxygen, per cent of saturation.					
		Maximum.		Minimum.		Mean.	
		Dilution basin.	Upper river.	Dilution basin.	Upper river.	Dilution basin.	Upper river.
1915.		<i>Second-ft.</i>					
July.....	3,343	(1)	(1)	(1)	(1)	(1)	(1)
August.....	8,418	(1)	(1)	(1)	(1)	(1)	(1)
September.....	6,668	98	98	74	91	86	94
October.....	8,820	100	100	76	91	88	95
November.....	4,500	97	100	73	94	85	97
December.....	8,332	97	100	95	100	96	100
1916.							
January.....	15,285	100	100	100	100	100	100
February.....	19,416	(1)	(1)	(1)	(1)	(1)	(1)
March.....	31,126	100	100	99	100	100	99
April.....	24,892	98	99	92	98	95	98
May.....	9,983	100	100	73	94	86	97
June.....	17,625	100	100	86	84	93	92

¹ No test made.

METROPOLITAN SEWERAGE DISTRICT.

The condition of streams entering the District was under careful observation throughout the year, and an appreciable increase in the degree of their pollution was noted. The gradual installation of sewerage systems in the bordering Maryland towns discharging their sewage into these streams, which flow through the park system of the District, is the principal cause of increase in the pollution. With the authority granted by Congress it will be possible to permanently remedy this condition as soon as action is taken by the Maryland authorities to provide the necessary intercepting sewerage to connect with the District system. Efforts by the Maryland Board of Health to secure State legislation to this end failed during the present year, but the legislature authorized the appointment of a board to report complete plans for legislation at the next biennial session.

STREAM POLLUTION.

As an indication of the present pollution of these streams the following is a tabulation of the bacteriological determinations from samples collected by this department at or near the District line. The laboratory work was done by the Hygienic Laboratory of the United States Public Health Service, to which acknowledgments are due for this assistance.

Bacteriological survey of streams, showing total bacteria and B.-coli per cubic centimeter in analysis of samples taken from streams as located.

Date.	Rock Creek at north end of Rock Creek Park.		Chevy Chase Branch at Brookville Road.		Little Falls Branch at Wisconsin Avenue.		Anacostia River at District line.	
	Total bacteria. ¹	B.-coli.	Total bacteria. ¹	B.-coli.	Total bacteria. ¹	B.-coli.	Total bacteria. ¹	B.-coli.
1915.								
July 1.....					293,000	1,000	25,000	1,000
July 12.....	130	100	400		30,000	1,000	580	100
July 19.....			3,000	10	113,000	1,000	10,000	100
July 20.....	470	100	21,000	100	430,000	10,000		
Aug. 2.....			19,400	1,000	51,000	10,000	12,400	1,000
Aug. 9.....	5,000		2,400	100	20,000	10,000		
Sept. 8.....			22,000	100	60,000	1,000	14,900	1,000
Sept. 14.....	70,000		10,000	1,000	52,000	1,000	2,800	1,000
Sept. 20.....							4,700	1,000
Sept. 27.....	300	10	4,000	100	40,000	10,000	5,000	1,000
Oct. 6.....	380		2,170	10	5,000	1,000	4,000	10
Oct. 13.....							2,600	100
Oct. 19.....	110	10	7,300	1,000	26,000	1,000	4,400	1,000
Oct. 26.....	160	1	5,200	1,000	10,200	1,000		
Nov. 2.....	280	10	16,500	1,000	140,000	1,000	19,100	1,000
Nov. 10.....	160	10	2,800	1,000	7,000	100		
Nov. 17.....	230	10	35,000	1,000	59,000	100	1,540	100
Nov. 23.....	740		96,000		41,000	100		
Dec. 1.....	130	10			80,000	10,000		
Dec. 21.....	6,000		25,000	1,000	55,000	1,000		
Jan. 5.....	130	10	1,150	1,000	12,000	10,000		
Feb. 1.....	540	10	1,240	1,000	170,000	10,000	2,300	100
Feb. 8.....	450		8,700	10,000	88,000	100,000		
May 3.....	120	10	4,800	1,000	33,000	10,000		
May 11.....	248	1	6,500	100	18,000	1,000		
June 20.....			500	800	18,000	1,000		
June 26.....			5,600	100	120,000	10,000	13,000	100

¹ Total bacteria on Agar, 37°.

DIVISION B.—OPERATION AND MAINTENANCE, SEWERAGE SYSTEM.

The maintenance work of the year included the inspection of the interior of all main sewers, 139.53 miles in length, and the inspection of 1,316 miles of pipe sewers. General repairs were made throughout the system on both main and pipe sewers, and their condition as to maintenance was excellent. There was no case of a stoppage of a public sewer during the fiscal year. The most important maintenance work included the construction of 1,100 linear feet of concrete floor in the B Street storm-water sewer between Thirteenth and Fifteenth Streets NW., the repair and improvement of the storm-water outlet of the Piney Branch trunk sewer, and repairs to the concrete and brick work of the following important sewers: Fourteenth Street trunk, Ontario Road trunk, Rock Creek main interceptor, Easby Point high level interceptor, and the Slash Run trunk.

The operating work for the fiscal year included the cleaning of 41,295 storm-water catchment basins on permanently paved streets and 4,219 catchment basins on suburban streets and roads. The total quantity of silt removed from the city basins was 5,718 tons, and from suburban basins 2,752 cubic yards. This is an increase of 141.5 tons from city basins and 188 cubic yards from suburban basins over the amount removed during the preceding year. The cost of cleaning city basins, including the cost of labor and team haul, but exclusive of disposal, was \$12,300.10, and the cost of cleaning suburban basins was \$2,364.87, a total of \$14,664.97. The average cost of cleaning city basins was \$0.297 per basin, against \$0.285 per basin for the preceding year, and the average cost per ton of silt removed was \$2.15, against \$2.32 for the preceding year. The average cost of cleaning suburban basins was \$0.565 per basin, against \$0.493 per basin for the preceding year, and the average cost per cubic yard of material removed was \$0.859, against \$0.811 per cubic yard for the preceding year. All material from city basins was delivered aboard scows, removed from the city front and deposited as fill back of the bulkhead line of the Anacostia River improvement, between Poplar Point and Giesboro Point, under permit from the United States Engineer Office. The cost of this disposal, including loading on scows, water transportation, unloading, and grading was \$5,295, and the average cost of this work per ton removed was \$0.925.

A total of 10,914 cubic feet of material was removed from sewers, and 71,500 cubic feet from the settling chamber of the sewage-disposal system, while 804,866 pounds of screenings were removed by the sewage screens and incinerated.

The following tabulation indicates the total length of sewers at the close of the fiscal year and gives the length and expenditure for 20 years for operation and maintenance, based on the total appropriation for this work and exclusive of sewage-disposal maintenance. This tabulation indicates a reduction in annual expenditure per mile, for operation and maintenance, in the past 20 years, from \$135.49 per mile to \$71.22 per mile. The gradual reduction in cost indicated has been accompanied by largely increased maintenance work and is due to improvements in efficiency and economy in this important branch of the service.

Year.	Length of sewers (miles).	Expenditure for maintenance.	Cost of maintenance per mile.	Year.	Length of sewers (miles).	Expenditure for maintenance.	Cost of maintenance per mile.
1897.....	369.04	\$50,000	\$135.49	1907 ¹	501.44	\$38,000	\$75.78
1898.....	352.73	50,000	130.62	1908 ¹	521.18	41,500	85.38
1899.....	394.92	50,000	126.61	1909 ¹	542.03	45,000	83.02
1900.....	408.08	50,000	122.52	1910 ¹	567.98	48,500	85.39
1901.....	421.34	50,000	118.67	1911 ¹	589.74	50,000	84.70
1902.....	436.89	50,000	132.76	1912 ¹	618.53	50,000	80.84
1903.....	448.09	58,000	129.44	1913 ¹	644.28	50,000	77.61
1904.....	456.87	58,000	126.95	1914 ¹	661.49	50,500	76.30
1905.....	468.86	58,000	123.70	1915 ¹	682.11	50,500	74.03
1906.....	484.40	42,000	86.70	1916 ¹	702.06	50,000	71.22

¹ Exclusive of sewage-disposal maintenance.

There are now 702.06 miles of main and pipe sewers and 5,557 catchment basins. The work of operation and maintenance includes the inspection, flushing, cleaning, and repairing of all the sewers and appurtenances. The record of cost of all work performed, including the comparative costs with preceding years, together with an accurate daily statement of work performed, is maintained on the card system.

The following summary gives a statement of the amount of work in this division for the fiscal year with details of expenditure for each class of work performed:

Cleaning and repairing, fiscal year 1916.

	Work.	Cost.
CLEANING AND INSPECTION.		
Inspection interior of all main sewers.....miles..	139.53	\$1,155.10
Inspection of pipe sewers.....do.....	1,316	
Flushing pipe sewers.....feet.....	6,949,719	3,953.05
Flushing of manholes.....do.....	17,611	
Flushing of storm-water receiving basins.....	15,793	864.80
Inspection and cleaning of gates, regulators, and sumps.....feet.....	2,102	1,233.73
Cleaning of main sewers.....do.....	3,743	688.02
Cleaning of pipe sewers.....do.....	156,733	3,556.90
Cleaning of basin outlets.....do.....	23	
Cleaning of gravel basins.....do.....	3	188.49
CLEANING OF STORM-WATER RECEIVING BASINS.		
City basins.....	41,295	
Labor.....		3,008.35
Teams.....		9,291.75
Total.....		12,300.10
County basins.....	4,219	
Labor.....		805.15
Teams.....		1,559.72
Total.....		2,364.87
Removal by scows:		
Loader.....		1,691.70
Transportation.....		1,483.30
Unloader.....		2,118.00
Total.....		5,293.00
Total cleaning of storm-water receiving basins.....		19,959.97

Cleaning and repairing, fiscal year 1916—Continued.

	Work.	Cost.
CLEANING OF STORM-WATER RECEIVING BASINS—Continued.		
Cleaning of sediment chamber.....		\$1,626.88
Cleaning of screens.....		4,900.15
Silt removed from main sewers.....cubic feet	5,694	
Material removed from pipe sewers.....do.	9,220	
Silt removed from gravel basins.....do.	1,877	
Silt removed from storm-water receiving basins, city.....tons	5,719	
Silt removed from storm-water receiving basins, county.....cubic yards	2,752	
Sludge removed from sediment chamber, main pumping station.....cubic feet	71,500	
Material removed from screens at main pumping station.....pounds	804,866	
REPAIRS.		
Relaying pipe sewers and basin connections.....feet	960	1,869.93
Abandoning pipe sewers.....do.	1,728	103.50
Special large connections to pipe sewers.....do.	34	310.00
Repairing main sewers.....		4,021.02
Inspection and repairs to house connections to main sewers.....	57	114.00
Settlements filled.....	13	80.70
Reconstruction of manholes.....	3	235.78
Adjusting and repairing manholes.....	123	812.43
Abandoning manholes.....	29	107.34
Replacing manhole frames.....	65	548.43
Replacing manhole covers.....	103	
Reconstructing basins.....	11	286.45
Adjusting and repairing basins.....	148	1,004.81
Abandoning basins.....	10	41.33
Replacing alley grates.....	20	222.64
Replacing alley frames.....	17	
Miscellaneous work.....		278.15

DIVISION C.—OPERATION AND MAINTENANCE, SEWAGE DISPOSAL SYSTEM, PUMPING STATIONS, SHOPS AND YARDS.

Under this division is included the operation and maintenance of the main pumping station, also of substations, gates, and regulators; the mechanical equipment of the sewer division, shops, stores, yards, and floating equipment, as well as the installation of mechanical apparatus and special construction.

The sewage-disposal system was in continuous operation throughout the year, handling the sewage of practically the entire district, as well as the storm water from the 900-acre low area within the dyke lines. The various pumping services were maintained without interruption and the preestablished hydraulic levels, both on the sewage and storm-water services, were not varied.

Main pumping station.—Sewage to the amount of 21,034,000,000 gallons and 303,000,000 gallons of storm water were pumped during the year, all the sewage being discharged through the outfall system to mid-channel in the Potomac River at Grimes. The following is a tabulation of the quantities for each month:

Total pumpage in gallons at the main sewerage pumping station for the year.

Month.	Sewage.	Storm water.	Month.	Sewage.	Storm-water.
1915.			1916.		
July.....	1,815,866,000	24,993,000	January.....	1,763,672,000	12,275,000
August.....	1,906,441,000	53,375,000	February.....	1,750,552,000	22,279,000
September.....	1,743,979,000	10,900,000	March.....	1,615,351,000	21,814,000
October.....	1,696,565,000	28,949,000	April.....	1,799,992,000	22,955,000
November.....	1,556,798,000	7,314,000	May.....	1,746,864,000	17,937,000
December.....	1,744,164,000	21,814,000	June.....	1,893,338,000	58,395,000

The expenditure of coal and other supplies for the year was as follows: Coal, 10,156,250 pounds; cylinder oil, 1,692 gallons; engine oil, 1,507 gallons; miscellaneous oils, 374 gallons; engine grease, 477 pounds; illuminating oil, 2,095 gallons; gasoline, 10,700 gallons. The latter included all usage of the department during the year. 2,227 pounds of cotton waste were used and 811 pounds of waste were washed and re-used.

Poplar Point pumping station.—The Poplar Point pumping station, located at the foot of Howard Avenue, was placed in operation July 21, 1915, and has been operated continuously thereafter, handling all the sewage from the east side of the Anacostia River between Poplar Point and Pennsylvania Avenue, and discharging the same into the main outfalls of the sewage-disposal system. This station is equipped with three motor-driven, direct-connected, vertical type, 14-inch centrifugal pumping units, electrically operated with automatic control, each having a capacity of 3,000 gallons per minute. The current for operating these units is generated at the main pumping station and delivered by submarine cables laid under the Anacostia River.

A total of 273,000,000 gallons of sewage was pumped at this station during the year. The following is a tabulation of the quantities pumped during each month of the year:

Total pumpage in gallons at the Poplar Point pumping station for the year.

Month.	Sewage.	Month.	Sewage.
1915.		1916.	
July.....	2,403,000	January.....	10,620,000
August.....	7,223,000	February.....	28,500,000
September.....	4,811,000	March.....	33,394,000
October.....	9,326,000	April.....	56,580,000
November.....	11,624,000	May.....	48,348,000
December.....	16,890,000	June.....	43,201,000

The expenditure of coal for the year for heating and incinerating purposes was 91,000 pounds; 59,000 pounds of waste matter was removed from the screens and incinerated.

Woodridge substation.—The Woodridge automatic substation, connecting with the upper east side interceptor of the sewage-disposal system and located at Eastern Avenue and Brentwood Road, was operated continuously throughout the year, handling all the sewage from the area in the vicinity of Woodridge, D. C. This station is equipped with two vertical type, motor-driven, electrically operated, centrifugal pumps with automatic control.

Sewage to the amount of 5,156,000 gallons was pumped during the year. Current used was furnished by the Potomac Electric Power Co. at the rate of \$0.06 per kilowatt hour. The average cost of pumpage was \$1.46 per million-foot gallons. The following is a tabulation of the quantities pumped during each month of the year:

Total pumpage in gallons at the Woodridge Substation for the year.

Month.	Sewage.	Month.	Sewage.
1915.		1916.	
July.....	305,700	January.....	342,400
August.....	360,600	February.....	616,700
September.....	327,800	March.....	574,000
October.....	383,200	April.....	682,000
November.....	184,500	May.....	438,500
December.....	306,300	June.....	634,300

The following are the principal items of betterment for the year:

Poplar Point pumping station.—The equipment of the Poplar Point pumping station was completed during the year and included: The erection of main switch-board; the construction and erection of electric recording indicators for suction and discharge levels; hydraulic gate valve board and indicators for distant control of all hydraulic gates; installation of two-stage centrifugal pressure pump for operating hydraulic gates and the construction and erection of screen cages. The inclosing fence and gateways were completed, lawns graded, and roadways paved during the year.

Woodridge substation.—The construction of the substation and installation of equipment was completed during the year. The exposed portion of the iron force-main crossing over the Baltimore & Ohio Railway was covered with air-cell asbestos to protect from freezing.

Main pumping station.—A 50-horsepower, vertical, compound, condensing engine for 35-kilowatt generating unit was erected in the dynamo room and placed in oper-

ation. Eight-inch automatic cut-off valves were installed on steam lines of boilers 1 and 2. An electric, motor-driven forge blower was installed in the blacksmith shop. A time-recording clock for the operating and shop force was installed.

Repairs and betterments, main pumping station.—Repairs were made to the copper reheating coils in second receivers of engines Nos. 1, 2, and 3, Class I, and engine No. 1 of Class II. A new valve bucket rod was made for condenser pump of engine No. 1, Class I; crank bearings were rebabbitted and low-pressure valve gear repaired on engine No. 1, Class II. An automatic stop valve was placed on generator No. 1, high and low pressure pistons were reset, and high and low pressure valves refitted on generators Nos. 2 and 3. In the boiler room the furnace arch of boiler No. 5 was replaced, the lower manifold to economizer repaired, the walls of the boiler room and boiler-room basement were cleaned and white coated. The concrete floor in the main pipe chamber was reconstructed. All sewage screens were thoroughly overhauled, scraped, cleaned, and painted. Tile floors were relaid around generator No. 1 and hydraulic gate valve board, and walls and ceilings in front offices and lobby were cleaned, pointed up, and painted. A metal roller door for fire protection was erected between carpenter shop and carpenter storeroom. Copper guttering around the main building was repaired and joints in stone coping pointed up. The main stack was thoroughly repaired, new points placed on lightning conductors, weathering joints in stonework pointed with red lead and litharge mastic, and the ladder cleaned and painted.

Stores.—Supplies, construction materials, and tools purchased during the year were received, inspected, and issued at storerooms and store yards. An accurate daily record is kept on the card system and quarterly reports made covering all expendable and unexpendable property. Annually an inventory of all property is taken in order to verify the accounts and close the records for the year. All property, tools, and equipment unfit for further service were delivered to the auditor's office for condemnation and sale.

Yard.—At the concrete plant 215 side basin tops, 93 corner basin tops, 12 special basin tops, 470 check blocks, 326 drip stones, and 908 concrete invert blocks for sewer construction were made during the year. Silt from storm-water catchment basins was weighed and loaded onto scows at this yard. Minor repairs were made to storehouse, paint shop, scale house, and roadways.

At the Poplar Point yard construction materials were stored and issued for day labor construction and repair work east of the Anacostia River.

Ink sludge from the settling basins constructed for the Bureau of Engraving and Printing was removed and disposed of by the department. The amount of this material removed and the cost of disposal is given in the following tabulation. The cost of this work was paid from the appropriation for "Material and miscellaneous expenses, Bureau of Engraving and Printing, 1916."

Material removed and the cost of cleaning the ink-settling basins of the Bureau of Engraving and Printing.

Date of cleaning.	Tons removed.	Unit cost removal per ton.	Unit cost team haul per ton.	Unit cost transportation and disposal per ton.	Total cost removal and disposal per ton.	Total cost removal and disposal.
1915.						
July 18.....	36.0	\$0.41	\$0.73	\$0.57	\$1.71	\$61.41
Aug. 18.....	38.9	.32	.72	.54	1.58	61.43
Sept. 23.....	33.9	.32	.82	.55	1.69	57.42
Oct. 28.....	34.3	.32	.81	.54	1.67	57.42
Dec. 2.....	34.6	.32	.80	.48	1.60	55.48
1916						
Feb. 12.....	48.3	.26	.65	.50	1.41	68.20
Apr. 28.....	46.3	.32	.68	.49	1.49	69.03
June 23.....	48.6	.35	.75	.74	1.84	89.33
Total and average.....	320.9	.33	.75	.55	1.63	519.72

Floating equipment.—During the year the floating equipment was employed in conveying waste materials removed from the sediment chamber, catchment basins, and ashes from the pumping station, to the point of disposal; in delivering construction materials to points along the water front where sewer work was in progress; in transportation in connection with the sanitary survey of the Potomac River; on

dredging in front of pumping station and sewer department yard, and dredging channel into the outfall wharf; also in the transportation of inspectors and assistant engineers. The hull of the towboat *Virginia* was cleaned and painted, engine completely overhauled, valves ground, and automatic water feed to cylinders and new cams were installed. Minor repairs were made to the launch. A new boom, boom socket, deck plates, and cables, and one three-fourth cubic yard clamshell bucket were installed on the dredge, and repairs made to engine house and platform. The pile driver was thoroughly overhauled and painted. One new flush deck scow was constructed; one scow cleaned and painted and three repaired.

Shops.—Work of the shops included repairs to pumping and other machinery, wagons, motor trucks, and construction equipment, repairs incident to maintenance and betterment of buildings, and electric lighting and power circuits. Sixteen basin-cleaning wagons, 6 hose reels, 15 wagons, 4 carts, and 1 buggy were thoroughly overhauled and painted. Small tools were made as follows: Thirty chisels, 80 drills, 12 hose bridges, 31 signs, 46 wrenches, 48 basin scoops, 2 manhole lifters, 2 wedges, and 71 miscellaneous tools. Small tools were repaired as follows: Four hundred and twenty-three chisels, 517 drills, 72 saws, 34 axes, 51 sections of hose, 3 wrenches, 3 root cutters, 24 basin scoops, 158 basin hammer blades, 3,637 picks, 80 wheelbarrows, 30 mattocks, and 236 miscellaneous tools. Four thousand eight hundred and sixty-eight manhole irons were made for construction work. Forms were made for 13 construction and repair jobs. Work was done in the shops in connection with 10 other sewer construction jobs. Other important shopwork for the year included the construction of 4 and 3 inch gasoline motor driven, centrifugal pumping units, mounted on trucks with rubber-tired wheels, for rapid transportation on emergency street service pumping.

Miscellaneous construction.—Automatic sewage regulators were installed on the Fillmore Street and Stickfoot Branch trunk sewers along the line of the Anacostia main intercepting sewer. Fifteen tide gates were built and hung at storm-water outlets along the Anacostia River. Forms and metal screens were made for a disintegrating tank designed for the Washington Steel & Ordnance Co.'s sewerage system at Giesboro Point.

Miscellaneous work.—Repairs were made to the various sewer department wharves and new piles were driven and floor repaired on public wharf near the main station.

DIVISION D.—CONSTRUCTION, SEWERAGE SYSTEM.

The following is a statement of the length of sewers constructed during the year and the cost of same aggregated for the several construction districts:

Section.	Length.	Cost.
	<i>Ft.</i>	
1. County west of Rock Creek.....	21,987.08	\$76,651.65
2. County east of Rock Creek.....	26,499.16	46,900.73
3. County west of Anacostia River.....	7,822.29	16,569.54
4. County east of Anacostia River.....	26,001.31	121,203.31
5. Washington City.....	19,503.46	59,110.21

The following is a detailed statement of sewers constructed in the various districts:

Western district, county west of Rock Creek.—In this area 2,702.48 linear feet of trunk sewers, 5,744.22 linear feet of service mains, and 13,540.18 linear feet of service sewers, a total of 21,987.08 linear feet, were constructed as follows: Foxhall Heights, 332 linear feet of service sewers; Potomac Heights, 110 linear feet of service sewers; University Heights, 195.43 linear feet of service sewers; Tennallytown, 791.55 linear feet of service sewers; Chevy Chase, 3,610.82 linear feet of service mains and 9,101.70 linear feet of service sewers, a total of 12,712.52 linear feet; Cleveland Park, 1,166.50 linear feet of trunk sewers, 2,123.60 linear feet of service mains, and 1,502.50 linear feet of service sewers, a total of 4,792.60 linear feet; Woodley Park, 996 linear feet of service sewers; Massachusetts Avenue Heights, 76 linear feet of service sewers; Georgetown, 568.98 linear feet of trunk sewers; Arizona, 967 linear feet of trunk sewers and 385 linear feet of service sewers, a total of 1,352 linear feet. Two storm-water receiving basins were constructed in this section during the year.

The following special work was done during the year: Tide gate chamber and stone facing was completed at the river end of the College Pond trunk sewer. The outlet section of the College Pond trunk sewer between the north side of Canal Road and passing in tunnel under the Chesapeake & Ohio Canal to the Potomac River was

completed during the year. This work was so designed as to connect with the Upper Potomac interceptor of the sewage-disposal system.

Contract was let for the construction of the Klinge Ford trunk sewer in Klinge Valley east of Connecticut Avenue, N. W.

Central district, county east of Rock Creek.—In this area 1,385.50 linear feet of trunk sewers, 3,466 linear feet of service mains and 21,647.66 linear feet of service sewers, a total of 26,499.16 linear feet were constructed as follows: Takoma, 517.20 linear feet of trunk sewers, 2,258 linear feet of service mains and 4,257.40 linear feet of service sewers, a total of 7,032.60 linear feet; Brightwood, 43.50 linear feet of trunk sewers and 3,415.16 linear feet of service sewers, a total of 3,458.66 linear feet; Petworth, 824.80 linear feet of trunk sewers, 775.20 linear feet of service mains and 10,302.80 linear feet of service sewers, a total of 11,902.80 linear feet; Mount Pleasant, 153 linear feet of service mains and 1,515.90 linear feet of service sewers, a total of 1,668.90 linear feet; Washington Heights, 279.80 linear feet of service mains and 2,156.40 linear feet of service sewers, a total of 2,436.20 linear feet. Fifty-two storm-water receiving basins were constructed in this section during the year.

Eastern district, county west of Anacostia River.—In this area, between North Capitol Street and Anacostia River, 1,006 linear feet of trunk sewers, 198.75 linear feet of service mains and 6,617.54 linear feet of service sewers, a total of 7,822.29 linear feet were constructed as follows: Brookland, 1,006 linear feet of trunk sewers, 34.25 linear feet of service mains, and 2,996.80 linear feet of service sewers, a total of 4,037.05 linear feet; Langdon, 164.50 linear feet of service mains and 2,105.74 linear feet of service sewers, a total of 2,270.24 linear feet; Eckington, 1,515 linear feet of service sewers. Five storm-water receiving basins were constructed in this section during the year.

Eastern district, county east of Anacostia River.—In this area, east of the Anacostia River, 3,454.10 linear feet of trunk sewers, 5,777.35 linear feet of service mains, and 16,769.86 linear feet of service sewers, a total of 26,001.31 linear feet were constructed as follows: Anacostia, 1,183.46 linear feet of service mains and 1,661.72 linear feet of service sewers, a total of 2,845.18 linear feet; Congress Heights, 1,928.94 linear feet of service sewers; Benning, 3,454.10 linear feet of trunk sewers and 2,692.90 linear feet of service mains, a total of 6,147 linear feet; Kenilworth, 1,900.99 linear feet of service mains and 13,179.30 linear feet of service sewers, a total of 15,080.19 linear feet. Thirteen storm-water receiving basins were constructed in this section during the year.

The following special work was done during the year: Tide-gate chambers with stone facing were completed at the river ends of the Burnt Bridge Run, Nailors Run, and Hawes Run trunk sewer outlets.

A sewage regulator chamber and interceptor connection was built between the Stickfoot Branch trunk sewer and the Anacostia main interceptor.

A screen and disintegrating tank for fresh sewage on the Washington Steel & Ordinance Co.'s sanitary sewer, at its connection to the outfall sewer, was built during the year.

Contracts were let and work started on the construction of the trunk sewer outlets at Smith's Branch, Ely's Run, Blaine Street, and Scagg's Run, between the established bulkhead line of the Anacostia River Improvement, east side Anacostia River, and the shore line. This work was necessary in advance of the filling of the Anacostia flats by the United States Engineer Office.

The Benning Road service main, between Anacostia River and Anacostia Road, was completed, affording an outlet for service sewers in the vicinity of Bennings.

Contract was let and work started on the construction of section No. 2 of the Michigan Avenue trunk sewer.

Washington City district.—In this area 209 linear feet of trunk sewers, 8,372.65 linear feet of service mains, and 10,921.81 linear feet of service sewers, a total of 19,503.46 linear feet were constructed, as follows: Northwest section, 117 linear feet of trunk sewers, 5,801.95 linear feet of service mains, and 6,653.39 linear feet of service sewers, a total of 12,572.34 linear feet; northeast section, 92 linear feet of trunk sewers, 557.50 linear feet of service mains and 3,289.40 linear feet of service sewers, a total of 3,938.90 linear feet; southeast section, 395.50 linear feet of service mains and 755.57 linear feet of service sewers, a total of 1,151.07 linear feet; southwest section, 1,617.70 linear feet of service mains and 223.45 linear feet of service sewers, a total of 1,841.15 linear feet. Sixty-five storm-water receiving basins were constructed in this section during the year, 47 storm-water basins were reconstructed, and 8 basins abandoned.

Eleven hundred linear feet of concrete floor was constructed in the B Street storm-water sewer between Thirteenth and Fifteenth Streets, N. W., replacing the old and defective timber floor in this sewer.

The following tabulation shows the construction of the sewerage system, the average cost per mile, the funds appropriated for sewer construction, and the approximate population for each year for 20 years:

Year.	Population.	Appropriations for construction.	Miles constructed.	Average cost per mile.
1897.....	264,000	\$283,947.96	17.49	\$16,234.87
1898.....	269,000	175,000.00	17.41	10,051.69
1899.....	274,000	158,629.00	10.18	15,582.44
1900.....	279,000	175,000.00	12.49	14,011.21
1901.....	284,000	250,000.00	13.25	18,867.92
1902.....	289,000	230,000.00	12.87	17,871.02
1903.....	294,000	170,000.00	16.42	10,353.23
1904.....	300,000	172,000.00	8.75	19,589.98
1905.....	305,000	168,650.00	11.90	14,065.89
1906.....	310,000	170,000.00	15.54	10,939.51
1907.....	315,000	333,000.00	17.09	19,485.08
1908.....	321,000	281,800.00	19.74	14,275.58
1909.....	326,000	259,500.00	18.01	14,408.66
1910.....	331,000	224,975.00	25.51	8,815.17
1911.....	341,000	219,040.00	23.18	9,449.53
1912.....	352,000	320,000.00	24.68	12,965.96
1913.....	353,000	320,000.00	23.52	13,605.44
1914.....	356,000	345,000.00	17.21	20,046.48
1915.....	359,000	382,500.00	20.54	18,622.20
1916.....	360,000	360,800.00	19.28	18,713.74

SEWAGE-DISPOSAL SYSTEM.

Rock Creek main intercepting sewer.—The construction of section No. 7 of this interceptor was completed during the year. This section embraced the laying of 60 linear feet of 54-inch diameter cast iron pipe under Rock Creek, just north of Boulder Bridge, 16 linear feet of 4 foot 6 inch diameter and 23.10 linear feet of 4 foot 6 inch by 5 foot brick and concrete sewer as well as the construction of a gate house at this point, provided with a 30 by 36 inch sluice gate, together with other controlling devices installed for the purpose of flushing and cleaning this line of sewer by the use of water admitted from Rock Creek.

Anacostia main intercepting sewer.—The construction of section No. 4 of the Anacostia main intercepting sewer, extending from Young Street to Hawes Run, a distance of 3,345 linear feet, was completed during the year.

Section No. 5, extending from Hawes Run to the Pennsylvania Railroad, a distance of 1,280 linear feet, was also completed during the year. These two sections complete the construction of the Anacostia main interceptor from the Poplar Point pumping station to the Pennsylvania Railroad, a distance of 13,230 linear feet.

The contract for section No. 6 of the Anacostia main interceptor was let during the year. This section will extend approximately 2,300 linear feet north of the Pennsylvania Railroad.

Length of main sewers and pipe sewers and number of storm-water basins constructed during the fiscal year ending June 30, 1916.

Appropriation.	Main sewers.	Pipe sewers.	Storm-water basins.
Main and pipe sewers.....	<i>Linear feet.</i> 1,283.50	<i>Linear feet.</i> 5,431.90	118
Suburban sewers.....	6,628.68	11,352.00	.....
Assessment and permit.....	.....	73,037.12	.....
Sewage-disposal system.....	4,583.90	.....	.....
Miscellaneous trust-fund deposits.....	.....	4,080.10	.....
Miscellaneous appropriations.....	.....	.....	19
Total.....	12,496.08	93,901.12	137

RECAPITULATION.

Total length of sewers on June 30, 1916:

Main sewers.....	miles.....	139. 53
Pipe sewers.....	do.....	562. 53
Total.....	do.....	702. 06
Cost of sewerage system, June 30, 1916.....		\$13, 294, 695. 25
Cost of sewage-disposal system, June 30, 1916.....		4, 671, 279. 19
Total.....		17, 965, 974. 44

DIVISION E.—MAPS, RECORDS, AND DRAFTING.

Considerable progress was made in constructing the detail set of maps showing all underground construction, including conduits, gas and water mains, sewers, vaults, building projections, as well as building restriction lines, curb, and street railway tracks. This is the most important map and record work of this office. The maps are constructed on the large scale of 10 feet to 1 inch, on mounted sheets 22 by 30 inches, with all structures accurately drawn to scale from actual detail field measurements, and the various constructions shown in color. The field measurements and other such data is recorded in loose-leaf cross-section books, the sheets being filed after use under detail card-index system for permanent reference. During the year 14 sectional maps were fully completed and 9 others were partly completed.

Detailed drainage studies have been prepared for 357 engineer department files and 97 plats prepared for extension of main and pipe sewers and for receiving basins. Thirteen files from the Health Office have required field work to determine availability of various public sewers for house connections; also 27 files have been forwarded, showing assessment on account of connections from parcel property to public sewers, for which 27 plats were prepared; 128 engineer department files of miscellaneous nature were acted on, making a total of 525 engineer department files forwarded for action during the entire year.

Twenty-five record maps of sewers have been made, greatly extending the territory formerly covered by this method of recording sewer construction; 8 old and badly worn record maps have been replaced by new ones; likewise the work of making minor repairs to maps still maintained for use has been creditably looked after; also the work of posting current construction on these maps has progressed up to date.

The counter tracings, for use by the public for information, have been posted with current construction and newly established or modified surface grades. Fourteen 50-foot scale counter tracings have been newly made and are in use by the public, largely extending the territory previously covered by these maps; also thirty-two 50-foot scale, and eight 100-foot scale badly worn and out of use counter tracings have been replaced by new maps.

The 100-foot scale working maps for the suburban districts have been kept posted to date with current construction, subdivisions, and newly established and modified surface grades. In addition this set of maps has been extended over a larger area of the suburban districts by the completion of 32 new maps.

Three hundred and eighty-six cards showing assessment to be pending for future sewers have been made, and 133 engineer department files, inclosing plats showing the construction of service sewers abutting assessable property, have been forwarded, through the Chief Clerk, engineer department, to the Assessor.

Twenty-seven letters have been forwarded to the Health Officer, with plats, as notice of newly constructed service sewers where same abutted existing houses; 117 existing houses were reported as abutting service sewers constructed during the year.

Important progress has been made on the card index of new subdivisions, 622 of same having been recorded. In connection with this work these subdivisions are also posted on maps, record made and notice prepared for the Assessor, upon subdivision of parcel property where same abuts service sewer, in order that the proper special assessment may be levied.

Two hundred and forty-nine new grade sheets have been made and recorded for work constructed during the year, and 4 old and badly worn grade sheets have been replaced by new sheets.

In order to develop the drainage system in step with the work of the water department in its construction of water mains throughout the suburban sections, a general map showing all proposed water mains is kept posted as such work is ordered.

Seventy-one street schedules of the surface division, covering 445 paving jobs, have been given careful consideration, and, where necessary, studies prepared for construction, reconstruction, or abandoning of sewers in advance of paving.

Fifty-six surface division grade maps for the establishment of new street grades have been studied with reference to the effect on the drainage system, and, where necessary, modifications requested before approval of same.

Plans, estimates, proposals, and specifications have been prepared for the construction of sewers under 31 contracts.

Fifty-four plats and deeds for rights of way have been prepared in connection with the extension of the public sewerage system, and of this number 32 have been acquired. In addition one permit has been granted by the United States Government for access to property under its control.

DIVISION F.—RECORDS AND ACCOUNTS.

The work of this division consists in the preparation of requisitions and vouchers, records of costs of construction, cost keeping, preparing pay rolls, and material and equipment accounting. It included for the year 951 construction jobs, 8,874 foremen's reports, 39,780 card records, 1,014 supply bills, 602 pay rolls, 1,238 requisitions, 226 transfer and refund vouchers, 697 tool and supply orders, 746 engineer department files, 41 letters, and 28,819 miscellaneous reports. The following abstract financial statement for the various sewer appropriations and other sewer funds gives a résumé of the expenditures. The total expenditure on account of sewers for the year amounted to \$684,521.16.

SEWERAGE SYSTEM.

Cleaning and repairing sewers and basins:

Appropriation.....		\$68,000.00
Expended—		
Mechanics, laborers, and watchmen.....	\$40,680.04	
Drivers and gate tenders.....	8,966.43	
Inspectors and other per diem employees.....	2,493.31	
Construction material and tools.....	1,708.73	
Repairs to equipment, equipment and supplies.....	9,983.52	
Paid surface division for repaving work.....	338.76	
Paid engineer department stables for forage, blacksmith work, etc.....	3,604.48	
Paid purchasing office for salaries.....	147.32	
		<u>67,922.59</u>
Unexpended balance.....		<u>77.41</u>

Maintenance and operation, sewage pumping service:

Appropriation.....		46,500.00
Expended—		
Mechanics, laborers, and watchmen.....	\$19,256.95	
Coal, oil, waste, and other supplies.....	23,627.75	
Tools and equipment renewals.....	3,527.79	
		<u>46,412.49</u>
Unexpended balance.....		<u>87.51</u>

Main and pipe sewers and receiving basins:

Appropriation.....		75,000.00
Expended—		
Contract construction.....	\$5,443.22	
Day labor construction.....	27,258.88	
Construction material and tools.....	10,276.57	
Inspectors and other per diem employees.....	4,022.12	
Paid surface division for repaving work.....	3,432.93	
Paid engineer department stables for forage, blacksmith work, etc.....	1,220.19	
Paid purchasing office for salaries, etc.....	589.19	
Paid chief clerk's office for salaries.....	401.00	
Paid office of assistant to engineer commissioner for salaries (Capt. Powell's office).....	162.00	
Paid disbursing office for salaries.....	96.00	
Paid corporation counsel's office for salaries.....	185.10	
Outstanding contracts and material to complete same.....	21,900.00	
		<u>74,987.20</u>
Unexpended balance.....		<u>12.80</u>

Suburban sewers:

Appropriation.....		\$160,800.00
Expended—		
Contract construction.....	\$49,697.95	
Day labor construction.....	22,026.94	
Construction material and tools.....	15,845.64	
Inspectors and other per diem employees.....	4,976.50	
Paid surface division for repaving work.....	161.41	
Paid engineer department stables for forage, blacksmith work, etc.....	1,183.80	
Paid purchasing office for salaries, etc.....	1,031.10	
Paid chief clerk's office for salaries.....	401.50	
Paid office of assistant to engineer commissioner for salaries (Capt. Powell's office).....	156.00	
Paid disbursing office for salaries.....	156.00	
Paid corporation counsel's office for salaries.....	185.10	
Outstanding contracts and material to complete same.....	64,900.00	
		160,721.94
Unexpended balance.....		78.06

Assessment and permit work, sewers:

Appropriation.....		125,000.00
Expended—		
Contract construction.....	\$35,004.38	
Day labor construction.....	42,692.65	
Construction material and tools.....	14,770.08	
Inspectors and other per diem employees.....	4,484.61	
Paid surface division for repaving work.....	2,109.48	
Paid engineer department stables for forage, blacksmith work, etc.....	899.29	
Paid purchasing office for salaries, etc.....	736.49	
Paid chief clerk's office for salaries.....	199.50	
Paid office of assistant to engineer commissioner for salaries (Capt. Powell's office).....	310.00	
Paid disbursing office for salaries.....	112.00	
Outstanding contracts and material to complete same.....	23,600.00	
		124,918.48
Unexpended balance.....		81.52

Miscellaneous trust-fund deposits, District of Columbia:

Unexpended balance of deposits from fiscal year 1915.....		4,185.00
Amount received from various depositors, fiscal year 1916.....		5,277.85
Total.....		9,462.85
Expended—		
Contract construction.....	\$3,898.89	
Day labor construction.....	1,840.51	
Construction material and tools.....	803.22	
Paid surface division for repaving work.....	189.07	
Contingent charges for engineering, supervision, wear of tools, etc.....	413.14	
		\$7,144.83
Inspection, cleaning, and repairing—		
Cleaning garage traps.....	169.95	
Inspection of vaults.....	98.00	
Inspection of conduits.....	9.00	
Repairs to wharf, Anacostia River, opposite lot 2, square 744.....	160.00	
		436.95
Returned to depositors.....		731.07
Carried over to 1917 for completion of work.....		1,150.00
		9,462.58

Sewer construction from miscellaneous appropriations:

Repayments.....		\$8,555.62
Expended—		
Sewer construction—		
Day-labor construction.....	\$4,196.02	
Construction material.....	2,160.07	
Paid surface division for repaving work.....	2.70	
Contingent charges for supervision, engineering, wear of tools, etc.....	633.78	
		6,992.57
Inspection, cleaning, and repairing—		
Inspection and repairs to trunk-sewer connections from houses.....	119.00	
Inspection and repairs to sewer connections from fire hydrants.....	247.00	
Special large size connections to sewers.....	370.00	
Adjusting basins and manholes in connection with surface division work.....	307.33	
Cleaning Bureau of Engraving and printing ink basins.....	519.72	
		1,563.05
		8,555.62

Summary of expenditures, sewerage system.

Cleaning and repairing, 1916.....	\$67,922.59
Maintenance and operation, 1916.....	46,412.49
Main and pipe sewers, 1915.....	8,894.09
Main and pipe sewers, 1916.....	53,087.20
Suburban sewers, 1915.....	81,717.83
Suburban sewers, 1916.....	95,821.94
Assessment and permit work, 1915.....	17,026.00
Assessment and permit work, 1916.....	101,318.48
Permit work, 1916.....	640.19
Miscellaneous trust fund deposits, District of Columbia, 1916.....	9,462.85
Miscellaneous appropriations, 1916.....	8,555.62
Condemnation, 1916.....	1,886.45
Outstanding contracts:	
Main and pipe, 1915.....	775.00
Main and pipe, 1916.....	21,900.00
Suburban sewers, 1915.....	3,800.00
Suburban sewers, 1916.....	64,900.00
Assessment and permit work, 1916.....	23,600.00
Total.....	607,720.73

The following are payments into the Treasury on account of assessment for service sewers under the appropriations indicated below during the fiscal year 1916:

Main and pipe sewers.....	\$340.43
Suburban sewers.....	1,363.36
Assessment and permit work, sewers.....	68,820.97
Total.....	70,524.76

Sewage-disposal system.

Anacostia main interceptor:

Appropriation.....		\$50,000.00
Expended—		
Contract construction.....	\$18,731.57	
Day-labor construction.....	3,413.57	
Construction material and tools.....	267.84	
Inspectors and other per diem employees.....	543.62	
New equipment, Poplar Point Pumping Station...	404.07	
Paid purchasing office for salaries.....	441.89	
Outstanding contracts and material to complete same.....	26,100.00	
		49,902.56
Unexpended balance.....		97.44

Summary of expenditures, sewage-disposal system.

Anacostia main interceptor, 1915.....	\$22, 826. 81
Anacostia main interceptor, 1916.....	23, 802. 56
Rock Creek main interceptor, 1915.....	3, 907. 69
Unused balances.....	163. 37
Outstanding contracts:	
Anacostia main interceptor, 1916.....	26, 100. 00
Total sewage-disposal system.....	76, 800. 43
Purchase and condemnation of land for rights of way for sewers:	
Appropriation.....	\$2, 000. 00
Expended, cost of rights of way, titles, and recorder fees.....	1, 886. 45
Unexpended balance.....	113. 55
<i>Total expenditures.</i>	
Sewerage system.....	\$605, 834. 28
Sewage-disposal system.....	76, 800. 43
Purchase and condemnation of land for rights of way.....	1, 886. 45
Total expenditures during fiscal year 1916.....	684, 521. 16

ALLOTMENTS.

Statement of expenditures under allotments made to other departments from sewer appropriations, fiscal year 1916.

Appropriations.	Engineer stables.	Purchasing officer.		Chief clerk, en- gineer de- part- ment.	Dis- bursing office.	Capt. Pow- ell's office.	Cor- pora- tion coun- sel's office.	Surface divi- sion.	Total.
		Salaries.	Sand wharf.						
Total allotments.....	\$7, 142. 92	\$2, 093. 62	\$852. 35	\$1, 002. 00	\$208. 00	\$628. 00	\$122. 20	\$248. 00	\$12, 297. 09
Expended:									
Cleaning and re- pairing.....	3, 604. 48	147. 32							3, 751. 80
Main and pipe.....	1, 220. 19	418. 72	162. 19	401. 00	96. 00	162. 00	61. 10	124. 00	2, 645. 20
Suburban sewers.....	1, 183. 80	726. 78	286. 75	401. 50	156. 00	156. 00	61. 10	124. 00	2, 939. 93
Assessment and permit work.....	899. 29	601. 40	54. 30	199. 50	112. 00	310. 00			2, 176. 49
Anacostia main interceptor.....		167. 33	70. 62						237. 95
Total expendi- tures.....	6, 907. 76	2, 061. 55	573. 86	1, 002. 00	208. 00	628. 00	122. 20	248. 00	11, 751. 37

Statement of expenditures under allotments from outside departments to sewer department during the fiscal year 1916.

Contingent expenses:	
Total allotment.....	\$1, 082. 24
Expenditures, stationery, printing, and supplies.....	1, 082. 24

Statement of expenditures for per diem employees, fiscal year 1916.

Cleaning and repairing.....	\$3, 266. 24
Main and pipe.....	5, 690. 68
Suburban sewers.....	7, 883. 06
Assessment and permit work.....	6, 526. 52
Anacostia main interceptor.....	752. 40
Rock Creek main interceptor.....	157. 50
Total.....	24, 276. 40

The following is a statement of the unexpended balances of the three principal construction appropriations from 1901 to 1915, inclusive:

Fiscal year.	Main and pipe sewers.	Suburban sewers.	Assessment and permit.	Total.
1901.....	\$1,656.53	\$2,237.61	.....	\$3,894.14
1902.....	2,610.75	6,745.80	.....	9,356.55
1903.....	3,948.39	5,762.88	.....	9,711.27
1904.....	268.70	2,072.54	.....	2,341.24
1905.....	5,676.05	6,926.46	.....	12,602.51
1906.....	7,177.09	4,798.30	.....	11,975.39
1907.....	255.68	11,038.27	.....	11,293.95
1908.....	3,878.93	815.05	.....	4,693.98
1909.....	678.12	570.80	.....	1,248.92
1910.....	622.34	4,486.94	.....	5,109.28
1911.....	489.36	401.36	.....	890.72
1912.....	3,716.32	791.12	.....	4,507.44
1913.....	119.82	13.36	\$118.16	251.34
1914.....	83.43	1,316.55	134.65	1,534.63
1915.....	37.00	441.18	3,785.50	4,263.68
Total.....	31,218.51	48,418.22	4,038.31	\$83,675.04

Statement of expenditures for supervision, inspection, and record on account of underground construction, public-service corporations, and the amounts charged to each of the several corporations for the fiscal year 1916.

Expenditures:	
Supervision.....	\$766.24
Inspection.....	1,050.84
Record.....	372.17
Total.....	2,189.25

Charged as follows:

Potomac Electric Power Co.....	1,047.60
Chesapeake & Potomac Telephone Co.....	244.45
Washington Gas Light Co.....	469.88
Georgetown Gas Light Co.....	310.46
Washington Railway & Electric Co.....	18.60
Capital Traction Co.....	63.94
Postal Telegraph Cable Co.....	14.55
Western Union Telegraph Co.....	19.77
Total.....	2,189.25

DIVISION G.—PUBLIC-SERVICE CORPORATIONS, UNDERGROUND CONSTRUCTION.

This branch of the sewer department is charged with the location and supervision of construction of gas mains, electric, telephone, and telegraph conduits and accessories. For each construction a permit is prepared, upon application, after careful study for interference with existing and future construction work and to assure an economical and orderly occupation of the public space, to prevent the unnecessary destruction of tree roots and cutting of new pavements. During construction the work is regularly inspected, compliance with the terms of the permit and good work are insisted upon, and an accurate record of the location of all work obtained from field measurements. Detailed record sheets are prepared and the work plotted on record maps and recorded on card system.

The work of the year may be summarized as follows:

Permits prepared upon application.....	1,253
New record cards made.....	1,253
New jobs inspected and recorded on sheets and maps.....	1,253
Inspections of work under construction.....	3,679
Daily average jobs under construction.....	24
New gas mains laid.....	10.3 miles..
Electric duct laid.....	46.3 do..
Manholes constructed.....	851
Drains from manholes and railway tracks.....	87
Houses connected with gas mains.....	1,815
Houses connected for electric light and power.....	1,023

PRIVATE PIPE LINES.

Applications received for gasoline and compressed-air pipes from building to curb.....	54
Permits denied.....	15
Permits approved.....	31
Pipes inspected, located, and recorded.....	19

PRIVATE VAULTS IN PUBLIC SPACE.

Applications approved.....	40
Vaults inspected, located, and recorded.....	39

WATER DEPARTMENT CONNECTIONS WITH THE SEWERAGE SYSTEM.

There were 237 permits issued the water department for drains from fire hydrants, blow-offs, air valves, and watering troughs, and 278 were inspected and recorded.

Certification of noninterference with existing underground construction of record was made in connection with 57 permits for driveways, 47 conduits constructed by electrical department, and 18 letters were written the public-service corporations at request of the surface division.

During the second half of the fiscal year much time was devoted to obtaining the most accurate information possible as to the location of gas mains to be plotted on a new set of standard office maps. Records were searched and locations checked in the field by means of the Grove electric indicator. Data as nearly complete as possible was thus obtained for 15 sections of the standard maps requiring 343 field tests.

RECAPITULATION.

Mileage of drainage system of the District of Columbia.

Construction during fiscal year 1916:

Main sewers.....	miles..	2.37
Pipe sewers.....	do....	17.78
Total.....		20.15

Total length of drainage system, June 30, 1916:

Main sewers.....	miles..	139.53
Pipe sewers.....	do....	562.53
Total.....		702.06

Cost of drainage system of District of Columbia.

Construction during fiscal year 1916:

Sewerage system.....	\$260,593.63
Sewage disposal system.....	47,092.88
Total.....	307,686.51

Total cost of constructing drainage system, June 30, 1916:

Sewerage system.....	13,294,695.25
Sewage disposal system.....	4,671,279.19
Total.....	17,965,974.44

Very respectfully, your obedient servant, A. E. PHILLIPS,
Superintendent of Sewers.

Capt. R. G. POWELL,
Corps of Engineers, United States Army,
Assistant to Engineer Commissioner, District of Columbia.

TABLES.

	Page.
Table No. 1. Sewerage system, contract construction.....	118
2. Sewage disposal system, contract construction.....	119
3. Permit system, sewers constructed.....	120
4. Assessment system, sewers constructed.....	121
5. Main and pipe catch basins constructed.....	122
6. Main and pipe sewers constructed.....	123
7. Suburban sewers constructed.....	123
8. Whole cost sewers constructed.....	124
9. Sewers constructed from miscellaneous appropriations.....	125
10. Inspectors and other per diem employees and the appropriation from which paid.....	126
11. Average cost of pipe sewers and basins fiscal year 1916.....	126
12. Average cost of pipe sewers for 15 years.....	127
13. Cost of sewer pipe, cement, sand, and gravel for 15 years.....	127
14. Maintenance work, sewerage system, for 10 years.....	127
15. Summary of sewerage system for 25 years.....	128
16. Rights of way acquired for sewer extension fiscal year 1916.....	128
17. Electric conduits laid fiscal year 1916.....	130
18. Electric conduits, total lengths by sizes to July 1, 1916.....	130
19. Electric conduits, lengths laid each year.....	132
20. Gas mains, lengths laid by sizes fiscal year 1916.....	132
21. Gas mains, lengths by sizes laid 1906-1916.....	133
22. Gas mains, lengths laid each year 1906-1916.....	133

TABLE NO. 1.—Sewerage system contract construction, fiscal year 1916.

Contract No.	Constructed.		Total cost.	Appropriation.	Contractor.
	Length.	Size.			
	<i>Feet.</i>				
5722	1,782.90	10 in.....	\$2,985.05	Suburban, 1915.....	George Hyman.
	1,842.00	12 in.....			
	2,085.10	24 in.....			
5725	1,173.00	6 ft. 9 in. by 6 ft.....	10,292.69	Assessment and permit, 1915.....	W. F. Brenizer Co.
5726	1,343.00	7 ft. by 6 ft.....	24,702.11	Suburban, 1915.....	
	96.40	4 ft. 6 in. by 5 ft.....	27,609.56	.....do.....	
5727	793.40	6 ft. by 6 ft.....	13,288.42	.....do.....	Do.
5744	710.10	3 ft. by 4 ft. 6 in.....	6,366.07	Suburban, 1916.....	Do.
	456.40	3 ft. by 4 ft.....			
	967.00	6 ft.....			
5750	1,069.77	6 ft. 6 in.....	24,084.18	.....do.....	Do.
	412.00	6 ft. 3 in.....			
	527.80	6 ft. 6 in.....			
5788	41.18	6 ft.....	15,282.07	Suburban, 1915.....	Do.
	20.00	4 ft.....			
	438.00	12 in.....			
5794A	343.50	18 in.....	1,303.46	Main and pipe, 1915.....	Do.
5794B	60.00	12 in.....	1,525.95	.....do.....	Do.
5795A				.....do.....	Do.
5795B	657.10	12 in.....	2,816.76	.....do.....	Do.
5795C	833.20	12 in.....	2,310.67	.....do.....	Do.
5795D	282.00	12 in.....	821.00	.....do.....	Do.
5795E	300.00	12 in.....	998.77	.....do.....	Do.
5796B	773.65	10 in.....	1,193.83	Assessment and permit, 1915.....	Do.
	533.60	21 in.....	2,849.94	.....do.....	Do.
5796D	555.55	12 in.....			
	221.85	10 in.....			
5796E	87.80	18 in.....	833.07	.....do.....	Do.
	365.60	15 in.....			
5797			(?)	Suburban, 1915.....	George Hyman.
5797A	1,247.80	12 in.....	2,323.38	Suburban, 1916.....	W. F. Brenizer Co.
	331.40	10 in.....		Assessment and permit, 1915.....	
	316.50	15 in.....		.....do.....	
5798C	283.50	12 in.....	1,534.16	.....do.....	George Hyman.
5825	3,515.57	12 in.....	5,272.87	Assessment and permit, 1916.....	W. F. Cush.
5839	1,136.43	12 in.....	4,620.29	.....do.....	George Hyman.
5931	1,422.85	10 in.....		Suburban, 1916.....	

¹ \$829.54 paid by the Connecticut Avenue Highlands Co.² Work not started.³ \$2,636.44 paid by Fulton R. Gordon.⁴ Repaving not reported.

TABLE NO. 1.—*Sewerage system contract construction, fiscal year 1916—Continued.*

Contract No.	Constructed.		Total cost.	Appropriation.	Contractor.
	Length.	Size.			
	<i>Feet.</i>				
5930	{ 655.71	12 in.....	1,848.52	{ Assessment and permit, 1916.	L. M. Johnston.
5940	{ 671.79	10 in.....		{ Suburban, 1916.	
5941	{ 564.70	24 in.....		{ do.	
5942	{ 448.40	18 in.....	3,282.22	{ Main and pipe, 1916.	Do.
5943	{ 440.40	15 in.....		{ do.	
	2,258.00	12 in.....	3,236.18	Assessment and permit, 1916.	Dabbs-Myers.
5944	{ 204.10	21 in.....	2,431.25	{ do.	Do.
	{ 489.40	18 in.....		{ do.	
	{ 270.30	12 in.....		{ do.	
	{ 376.20	10 in.....		{ do.	
5947	628.65	15 in.....	{ 1,010.10	{ Main and pipe, 1916.	W. F. Brenizer Co.
			{ 741.86	{ Assessment and permit, 1916.	
				{ Suburban, 1916.	
5948	{ 1,455.65	15 in.....	4,179.76	{ Assessment and permit, 1916.	Do.
	{ 777.35	12 in.....		{ do.	
5949	{ 460.00	12 in.....	12,355.24	{ Suburban, 1916.	George Hyman.
5955	{ 1,750.00	24 in.....		{ do.	
	477.61	24 in.....	4,060.20	Assessment and permit, 1916.	Chas. H. Tompkins.
5956	{ 734.00	18 in.....	210,393.54	{ Assessment and permit, 1916.	Harper & Voigt.
	{ 890.00	15 in.....		{ Suburban, 1916.	
	{ 4,565.00	10 in.....		{ Assessment and permit, 1916.	
	{ 1,934.00	10 in.....		{ do.	
5957	{ 348.60	10 in.....	619.92	Assessment and permit, 1916.	W. F. Brenizer Co.
			2,925.86	Suburban, 1916.	
	1,785.00	12 in.....	1,063.04	Assessment and permit, 1916.	Do.
5958	{ 660.60	12 in.....	2,285.57	{ do.	
	{ 804.40	10 in.....		{ do.	
5962	1,258.60	12 in.....	1,196.35	Main and pipe, 1916.	L. M. Johnston.
5978			(³)	do.	W. F. Brenizer Co.)
5979			(³)	do.	Do.
5980			(³)	do.	Do.
6026			(³)	Suburban, 1916.	W. D. Murray Co.(Inc.).
6048			(³)	Main and pipe, 1916.	W. F. Brenizer Co.
			(³)	Assessment and permit, 1916.	Do.
6050			(³)	Suburban, 1916.	L. M. Johnston.
6053			(³)	Assessment and permit, 1916.	George Hyman.
6054			(³)	do.	Do.
	51,792.11		208,770.75		

¹ Repaving not reported.

² Continued in 1917.

³ Work not started.

TABLE NO. 2.—*Sewage-disposal system contract construction, fiscal year 1916.*

Contract No.	Section.	Total cost.	Appropriation.	Contractor.
5787	Rock Creek interceptor, section 7.....	{ \$4,753.75 23,160.74 8,856.83	Rock Creek main, 1915.	W. F. Brenizer Co.
5792	Anacostia main intercepting sewer, main section 4.		Anacostia main, 1915..	
5925	Anacostia main intercepting sewer, section 5.		Anacostia main, 1916..	
6027	Anacostia main intercepting sewer, section 6.	(¹)	do.	Do.
		47,092.88	Anacostia main, 1917..	Do.

¹ Not started.

TABLE No. 3.—*Sewer construction under permit system from the appropriation for assessment and permit work for the fiscal year 1916.*

Order No.	Location.	Length.	Size.	Amount of deposit.	Cost.		Total cost.	Amount returned.	For whom done.
					To District of Columbia.	To depositor.			
1	East side of Sixteenth Street NW. at I Street.....	<i>Feet.</i> 88.2	<i>Inches.</i> 18	} \$220.00	\$193.89	\$193.89	\$387.78	\$56.11	T. H. Pickford. Fulton R. Gordon. John Massey.
2	Crossing Broad Branch Road with Northampton Street outlet sewer.....	54.15	12		346.71	346.72	693.43	.....
4	Twelfth Street N.E., Olds and Newton Streets.....	130	10		99.58	96.59	199.17	15.41	
	Total.....	337.60	.....	711.71	640.19	640.19	1,280.38	71.52

TABLE NO. 4.—Sewer construction under the assessment system from the appropriation for assessment and permit work for the fiscal year 1916.

Order No.	Length.	Size.	Total cost.	Order No.	Length.	Size.	Total cost.
		<i>In.</i>				<i>In.</i>	
100.....	415.38	12	\$486.36	180.....	448.22	10	\$591.70
101.....	78.70	15	210.16	181.....	625.00	12	729.37
102.....	9.00	12	69.32	182.....	136.55	12	238.27
103.....	8.00	12	44.17	183.....	23.00	12	35.65
104.....	186.40	10	367.69	184.....	{ 400.86	15	661.83
105.....	300.00	12	493.86	185.....	{ 137.73	12	
106.....	240.00	10	345.04	186.....	522.77	10	644.38
107.....	18.00	12	68.98	187.....	458.70	12	490.45
108.....	419.84	12	501.99	188.....	322.00	24	838.39
109.....	666.00	10	859.50	189.....	120.00	10	163.99
110.....	173.60	12	240.91	190.....	156.70	10	172.27
111.....	191.70	10	318.49	191.....	520.00	10	669.29
112.....	492.30	10	461.97	192.....	104.30	8	83.10
113.....	389.00	12	523.49	193.....	163.50	12	279.28
114.....	336.40	12	393.49	194.....	101.58	10	136.60
115.....	118.00	18	914.58	195.....	97.70	12	222.05
	275.00	15		196.....	460.45	12	877.03
	164.00	12		197.....	571.40	10	544.65
116.....	247.50	10	408.45	198.....	200.18	10	272.21
117.....	15.00	18	71.82	199.....	180.00	12	152.65
118.....	98.95	12	206.44	200.....	{ 139.40	12	221.20
119.....	82.00	12	156.06	201.....	{ 104.00	10	
120.....	253.90	10	339.22	202.....	310.00	10	461.68
121.....	140.50	10	177.90	203.....	411.30	10	321.90
122.....	387.10	12	496.27	204.....	270.00	15	591.47
123.....	390.50	15	692.78	205.....	235.50	12	286.21
124.....	301.50	10	339.50	206.....	37.50	8	48.48
125.....	93.67	10	220.87	207.....	327.00	10	340.59
126.....	12.00	10	15.79	208.....	143.00	12	189.62
127.....	138.11	10	355.33	209.....	14.00	12	97.32
128.....	190.55	10	303.64	210.....	710.00	12	969.56
129.....	117.87	10	275.97	211.....	223.00	10	243.90
130.....	58.00	12	151.91	212.....	80.00	10	104.78
131.....	38.90	12	56.73	213.....	331.00	12	454.13
132.....	144.20	12	243.57	214.....	301.30	12	608.16
133.....	140.00	12	214.57	215.....	158.60	12	225.80
134.....	432.00	12	811.43	216.....	126.00	12	244.67
135.....	256.30	12	367.17	217.....	408.55	12	619.17
136.....	110.00	12	201.88	218.....	.....	(2)	36.70
137.....	30.00	10	41.06	219.....	180.00	12	597.42
138.....	110.00	10	187.20	220.....	220.60	8	254.83
139.....	90.00	12	182.40	221.....	255.35	8	187.10
140.....	50.50	12	109.27	222.....	84.80	10	89.00
141.....	529.90	10	769.34	223.....	88.20	12	261.27
142.....	450.00	12	514.97	224.....	92.50	10	156.04
143.....	429.80	12	508.81	225.....	123.00	10	178.98
144.....	147.50	10	198.90	226.....	314.33	12	431.61
145.....	214.60	12	566.38	227.....	149.00	8	138.12
146.....	185.70	15	700.29	228.....	25.00	12	113.48
147.....	192.20	15	483.52	229.....	216.50	10	696.19
148.....	332.00	12	546.80	230.....	300.00	12	418.86
149.....	47.00	15	82.48	231.....	310.00	12	508.79
150.....	190.20	10	295.50	232.....	425.00	12	762.79
151.....	158.10	12	494.76	233.....	140.00	12	197.56
152.....	20.00	8	68.98	234.....	46.00	8	153.88
153.....	120.00	10	240.31	235.....	378.40	10	545.29
154.....	208.20	10	219.26	236.....	{ 26.00	15	214.19
155.....	100.00	12	170.64	237.....	{ 160.70	12	
156.....	80.00	10	89.54	238.....	195.43	12	263.40
157.....	286.50	10	323.88	239.....	{ 85.00	8	849.41
158.....	355.70	18	636.37	240.....	{ 535.50	10	
159.....	508.56	12	602.40	241.....	364.50	12	435.07
160.....	20.00	12	84.88	242.....	366.50	10	549.93
161.....	50.00	10	121.42	243.....	373.50	15	497.07
162.....	11.50	12	39.03	244.....	622.50	12	678.50
163.....	140.00	10	263.64	245.....	220.80	10	327.29
164.....	25.00	10	35.78	246.....	50.00	10	59.20
165.....	385.00	15	489.46	247.....	76.00	18	191.38
166.....	116.00	12	216.14	248.....	577.00	10	631.66
167.....	260.70	15	417.58	249.....	236.00	12	1 377.90
168.....	294.10	15	531.86	250.....	{ 20.20	15	1 415.73
169.....	75.47	10	203.60	251.....	{ 120.00	12	
170.....	134.77	10	266.83	252.....	248.00	10	264.64
171.....	524.89	8	672.51	253.....	84.00	12	2 128.29
172.....	70.00	10	72.30		.....	12	2 384.16
173.....	376.70	12	577.67		198.40	12	87.99
174.....	260.74	10	505.49				
175.....	306.60	18	696.87				
				Total.....	33,937.30	.....	51,450.95

¹ Repaving not reported.² Work not completed.

TABLE NO. 5.—*Basin construction from the appropriation for main and pipe sewers, fiscal year 1916.*

Order No.	Basins.	Total cost.	Order No.	Basins.	Total costs.
500.....	1	\$9.25	549.....	1	\$267.38
501.....	3	315.27	550.....	1	68.54
505.....	1	68.76	551.....	8	477.20
507.....	1	88.17	553.....	1	163.17
508.....	1	91.36	554.....	2	269.65
510.....	1	61.49	555.....	4	291.23
511.....	3	238.23	557.....	2	130.17
512.....	2	167.52	561.....	1	160.62
513.....	1	58.31	563.....	3	338.07
514.....	8	687.03	565.....	1	144.00
515.....	1	94.15	572.....	1	59.96
516.....	1	107.93	573.....	1	140.15
517.....	2	141.00	577.....	2	470.71
518.....	3	200.60	581.....	1	61.75
519.....	2	169.45	586.....	2	249.57
520.....	1	80.14	587.....	2	378.41
521.....	3	212.61	593.....	2	313.95
522.....	2	126.69	595.....	1	87.43
523.....	1	78.48	596.....	1	52.53
525.....	1	79.30	597.....	1	66.80
526.....	1 ¹	4.00	603.....	1	107.06
529.....	1	47.76	610.....	1	178.35
531.....	1 ¹	8.00	617.....	1	153.32
532.....	1	202.24	619.....	6	576.67
533.....	1	110.29	620.....	1	56.67
534.....	1	101.90	621.....	1	43.02
535.....	1	87.86	622.....	1	58.84
536.....	1	85.35	623.....	1	82.84
539.....	1	78.22	624.....	11	736.13
540.....	1	96.72	625.....	6	364.04
542.....	1	81.77	627.....	1	87.30
543.....	4	344.85	630.....	3	410.16
544.....	1	100.92	631.....	2	² 131.77
545.....	3	249.97	635.....	1	85.16
546.....	1	67.94			
547.....	2	182.35	Total.....		12,349.82
548.....	2	171.35			

¹ Basin abandoned.² Repaving not reported.

TABLE No. 6.—Sewer construction from the appropriation for main and pipe sewers, fiscal year 1916.

Order No.	Length.	Size.	Total cost.	Order No.	Length.	Size.	Total cost.
		<i>Inches.</i>				<i>Inches.</i>	
502	261 feet.....	18	\$933.23	583	House laterals.....		\$54.81
503	281.80 feet.....	12	823.04	584	200 feet.....	15	1,153.93
506	113 feet.....	15	313.27		166 feet.....	12	
509	198.12 feet.....	12	720.80	585	Manhole.....		81.48
524	103.30 feet.....	12	273.37	588	House laterals.....		73.76
527	140 feet.....	12	270.59	589	do.....		68.73
528	122 feet.....	12	430.94	590	Manholes.....		72.59
530	362.70 feet.....	12	1,123.15	591	29.40 feet.....	12	132.43
537	Manholes.....		48.32	592	10 feet.....	24	19.92
538	298.30 feet.....	24	1,392.97	598	Manhole.....		55.85
	103.80 feet.....	18		599	do.....		52.32
541	29 feet.....	12	645.85	600	Manholes.....		240.37
	135 feet.....	6		601	Manhole.....		58.69
	79 feet.....	21		602	do.....		68.60
552	398 feet.....	15	878.55	604	11 feet.....	10	80.91
	156.70 feet.....	12		605	Manhole.....		62.24
556	House laterals.....		47.52	606	do.....		50.66
	42 feet.....	21		607	do.....		48.98
558	373 feet.....	18	916.14	608	House laterals.....		70.25
	33.50 feet.....	15		609	Manhole.....		299.52
	16 feet.....	12		612	do.....		165.03
559	House laterals.....		70.70	613	75.40 feet.....	18	396.83
	348 feet.....	18			344 feet.....	15	
560	12 feet.....	15	945.61	614	59.40 feet.....	12	834.09
	12 feet.....	12		615	Manhole.....		32.99
562	Manhole.....		157.59	616	97.70 feet.....	12	157.62
564	Manholes.....		176.79	626	House laterals.....		24.81
566	41 feet.....	10	81.59	628	79 feet.....	12	168.53
567	House laterals.....		217.28	629	House laterals.....		126.91
569	Manhole.....		87.87	632	17 feet.....	30 by 42	1,183.70
571	do.....		70.70	633	Manhole.....		88.89
574	do.....		74.23	634	House laterals.....		184.25
576	House laterals.....		315.22	636	181 feet.....	12	1,517.16
578	Bulkheads.....		44.61	637	House laterals.....		19.95
580	Manholes.....		148.51				
582	465 feet.....	12	842.09		Total.....		17,687.33

¹ Repairing not reported.

TABLE No. 7.—Sewer construction from the appropriation for suburban sewers, fiscal year 1916.

Order No.	Length.	Size.	Total cost.	Order No.	Length.	Size.	Total cost.
	<i>Lin. feet.</i>	<i>In.</i>			<i>Lin. feet.</i>	<i>In.</i>	
800.....	317.9	24	\$827.82	822.....	43.5	15	\$175.85
801.....	48.8	18	170.46	823.....	(9)		344.57
802.....	(1)		21.66	825.....	51	15	165.51
803.....	(0)		939.62	826.....	34.25	15	165.51
804.....	(2)		97.28	827.....	166.1	24	511.10
805.....	387.6	12	512.82	828.....	18	10	55.84
806.....	387.6	12	526.78		30	12	
807.....	146	12	329.86		14	24	
808.....	180.8	18	418.37	829.....	92	4½	1,148.24
809.....	398.2	18	654.50	830.....	(9)		36.19
810.....	67	10	91.83	831.....	212.4	24	562.44
811.....	37	12	105.10	832.....	21.3	12	73.67
812.....	139.8	15	393.35	833.....	147	24	515.41
813.....	{ 344.7	24	848.85	834.....	35.3	15	109.83
	3	18		835.....	545.7	10	664.04
815.....	22.5	15	68.13		(9)		563.94
816.....	271.06	24	945.14	837.....	230	21	595.36
817.....	63	18	580.67	838.....	164.5	10	336.36
818.....	5	10	54.91	839.....	7	12	54.60
819.....	(9)		340.29	840.....	45	10	140.21
820.....	(9)		444.27				
821.....	(9)		481.59		Total.....	4,699.41	15,014.58

¹ Regulator chamber.

² Interceptor connection.

³ Facade walls and gate chamber.

⁴ Manhole.

TABLE No. 8.—*Sewer construction under whole cost system from miscellaneous trust fund deposits for fiscal year 1916.*

Order No.	Location.	Length.	Size.	Remarks.	Amount of deposit.	Cost of work.	Amount returned.	For whom done.
		<i>Lin. feet.</i>	<i>Inches.</i>					
1001	South side of Q Street N.W., Tenth and Eleventh Streets.			1 Y branch set.	\$25.00	\$11.73	\$12.27	Henry Schaffert,
1002	Alley square 2591.	26	10		175.00	113.31	31.69	L. E. Hooper,
1003	Upshur Street N.W., Fifth Street and Illinois Avenue.	90.7	10		175.00	113.31	31.69	A. C. Moses Construction Co.
1004	Jocelyn Street N.W., Thirty-ninth Street and Reno Road.	432	8		275.00	239.76	170.71	Thos. J. Fisher Co. (Inc.).
1005	Fifth Street N.W., south of Aspen Street.	24	8		275.00	239.76	35.24	John Schrivener & Bro.
1006	Alley square 2107.	5	12		20.00	10.98	9.02	Israel Diamond.
1007	Alley square 2107.	20	12		75.00	55.97	19.03	Henry Keller.
1008	Alley square 611.	65.15	10		200.00	163.32	36.68	Cansburg & Bro.
1009	Alley square 631.	178	10	1 manhole.	550.00	416.06	133.94	W. E. Barker.
1010	Alley square 2078.	136	10		255.00	124.05	102.05	J. E. Crutcher.
1011	Quincy Street N.W., Cedar Road and Thirteenth Street.	6.5	10		15.00	7.90	7.10	J. E. Chapman.
1012	Alley square 617.	6.5	10		85.00	62.83	22.17	J. T. Jamieson.
1013	Seventh Street N.W., Dahlia and Elger Streets.	60	10	By-pass connections, settling and screen chambers, gate well.	500.00	438.85	41.15	Washington Steel & Ordinance Co.
1014	At outfall sewer, Washington Steel & Ordinance Co.							
1015	Grounds of Columbia Institute for the Deaf.	12	21		40.00	24.22	15.78	Louis L. Hooper, disbursing agent.
1016	Eighteenth Street N.W., north of N Street.	{ 25.25 54.5	24 15	2 manholes.	225.00	196.54	28.46	Clarke Waggaman.
1017	Seventeenth and H Streets N.W.			Basin connection.	5.85	5.85	None.	Washington Railway and Electric Co.
		1,371.10			3,205.85	2,536.95	668.90	

TABLE NO. 9.—*Sewer construction from miscellaneous appropriations, fiscal year 1916.*

Order No.	Location.	Work done.	Total cost.	Appropriation.
1100	Crossing Seventeenth Street NE., line alley, square 4540.	101 feet 8-inch pipe; 53 feet 12-inch pipe.	\$244.09	Maintenance of playgrounds, 1916.
1101	Twenty-first and N Streets NW.	1 basin.....	88.59	Repairs to streets, District of Columbia, 1916.
1102	Seventh and K Streets NE.....	.....do.....	71.46	Improvements and repairs, 1916, northeast schedule.
1103	Fifth Street NW. at O and at Kidge Streets.	2 basins.....	131.40	Repairs to streets, District of Columbia, 1916.
1104	Nineteenth and E Streets NW..	1 basin.....	62.54	Improvements and repairs, 1916, northwest schedule.
1105	Seventeenth Street NE., Law- rence and Monroe Streets.	4 feet 3 by 6 foot sewer.	28.07	Repairs to suburban roads, 1916.
1106	Seventh Street and P Street NW	1 basin.....	75.14	Improvements and repairs, 1916, Seventh Street NW. from New York Avenue to O Street.
1107	N Street NW., Thirteenth Street and Vermont Avenue.	.....do.....	151.44	Repairs to streets, District of Columbia, 1916.
1108	Second and T Streets NE.....	2 basins.....	139.90	Do.
1109	Pennsylvania Avenue NW., Twenty-sixth Street and Rock Creek.	36 feet 12-inch pipe.	120.91	B. H. Hardaway (retent).
1110	N Street NW., Twelfth Street and Vermont Avenue.	2 basins.....	29.98	Repairs to streets, District of Columbia, 1916.
1111	Fifteenth and K Streets NW....	1 basin.....	90.38	Do.
1112	Flagler Place and W Street NW.	.....do.....	87.60	W Street NW., North Capitol Street to Flagler Place.
1113	Seventh and Q Streets NW.....	.....do.....	21.42	Improvements and repairs, 1916, Seventh Street NW., New York Avenue to O Street.
1114	.....do.....	.....do.....	88.41	Do.
1115	Tenth Street NW. at B Street, C Street, and Louisiana Ave- nue.	6 basins.....	632.49	Improvements and repairs, 1916, Tenth Street, B to Pennsyl- vania Avenue.
1116	Twenty-fifth Street NW. at K Street and at Pennsylvania Avenue.	3 basins.....	22.86	Repairs to streets, District of Columbia, 1916.
1117	Fourteenth Street and Park Road.	Repairs.....	35.45	Maintenance of playgrounds, 1916.
1118	Alley, square 3050.....	1 basin.....	60.90	Improvements and repairs, 1916, A and P Streets.
1119	Nichols Avenue SE., Good Hope Road, etc.	9 basins.....	673.71	Improvements and repairs, 1916, paving Nichols Avenue.
1120	C Street NE. at Warren and at Fifteenth Streets.	2 basins.....	127.18	Improvements and repairs, 1916, northeast schedule.
1121	Douglas Street NE., west of Third Street.	21 feet 18-inch pipe	51.30	Improvements and repairs, 1916, suburban roads.
1122	E Street NW., Eighteenth and Nineteenth Streets.	436.35 feet 21-inch pipe.	11,539.11	Building Interior Department offices.
1123	Eighth Street and Florida Ave- nue NW.	1 basin.....	70.42	Improvements and repairs, Dis- trict of Columbia, 1916, special.
1124	Pennsylvania Avenue SE., west of Third Street.	.....do.....	83.25	Improvements and repairs, Dis- trict of Columbia, 1916, repairs to streets.
1125	Fourth Street SE., C Street and North Carolina Avenue.	2 basins.....	117.11	Do.
1126	Nichols Avenue SE., south of V Street.	1 basin.....	76.70	Improvements and repairs, 1916, repaving Nichols Avenue.
1127	N Street SW., First and Second Streets.	3 basins.....	190.08	Improvements and repairs, Dis- trict of Columbia, 1916, south- west schedule.
1128	Hanover Place and North Cap- itol Street NW.	1 basin.....	70.54	Improvements and repairs, Dis- trict of Columbia, 1916, north- west schedule.
1129	Twelfth and C Streets SE.....	2 basins.....	71.57	Improvements and repairs, Dis- trict of Columbia, 1916, south- east schedule.
1131	Twenty-third and Q Streets NW	1 basin.....	89.76	Construction of Q Street Bridge.
1132	Fourteenth and A Streets NE...	.....do.....	88.16	Improvements and repairs, Dis- trict of Columbia, 1916, north- east schedule.
1135	E Street NW., Eighteenth and Nineteenth Streets.	2 Y branches.....	27.57	Building Interior Department offices.
1136	Ninth and I Streets SW.....	1 basin.....	69.31	Improvements and repairs, Dis- trict of Columbia, 1916, south- west schedule.
1137	Eighteenth and C Streets NW...	Sewer connection	31.85	Maintenance of playgrounds, 1916.
1138	Fourteenth and A Streets SE...	3 basins.....	231.29	Improvements and repairs, Dis- trict of Columbia, 1916, south- east schedule.

1 Repaving not reported.

TABLE NO. 9.—*Sewer construction from miscellaneous appropriations, fiscal year 1916—Continued.*

Order No.	Location.	Work done.	Total cost.	Appropriation.
1139	Tenth and I Streets NE.....	1 basin.....	\$59.09	Improvements and repairs, District of Columbia, 1916, A and P Streets.
1140	Fourteenth Street SW., B and C Streets.	Drain.....	23.12	Washington Aqueduct, 1916, maintenance and operation.
1141	Fifth Street NW., L and M Streets.	4 basins.....	225.51	Improvements and repairs, District of Columbia, 1916, A and P Streets.
1142	Georgia Avenue NW., Morton and Quebec Streets.	8 basins.....	74.78	Suburban roads and streets, 1916, Georgia Avenue.
1143	Rock Creek Church Road and Georgia Avenue.	1 basin.....	165.79	Suburban roads and streets, 1916.
1144	Georgia Avenue NW., north of Euclid Street.	27 feet 12-inch pipe	45.24	Water department, 1916, high service.
1147	Sixth Street SW., north of Maine Avenue.	2 basins.....	1 403.60	Elimination of grade crossings, 1916.
1148	Euclid Street and Sherman Avenue NW.	27 feet 12-inch pipe	1 29.25	Water department, 1916, high service.
1149	Georgia Avenue, north of Rock Creek Church Road.	1 basin.....	1 73.89	Improvements and repairs, District of Columbia, 1916, repairs to streets.
	Total.....		6,892.61	

TABLE NO. 10.—*Inspectors and other employees of the sewer division, temporarily employed, and the appropriations from which paid, fiscal year 1916.*

Appropriations.	Inspectors.	Overseers.	Other employees.	Total.
Construction, sewerage system:				
Main and pipe sewers.....	\$1,551.88	\$665.00	\$3,473.80	\$5,690.68
Suburban sewers.....	3,966.56	198.00	3,718.50	7,883.06
Assessment and permit work.....	2,071.43	1,148.50	3,306.59	6,526.52
Construction, sewage-disposal system:				
Anacostia main interceptor.....	364.50		387.90	752.40
Rock Creek main interceptor.....	157.50			157.50
Maintenance: Cleaning and repairing.....	1,587.44	301.50	1,377.30	3,266.24
Total.....	9,699.31	2,313.00	12,264.09	24,276.40

TABLE NO. 11.—*Average cost of constructing pipe sewers and storm-water receiving basins for fiscal year 1916.*

Size of sewer.	Unit cost per foot.		Total cost per foot.
	Labor.	Material.	
8-inch diameter.....	\$0.756	\$0.245	\$1.001
10-inch diameter.....	1.003	.364	1.367
12-inch diameter.....	1.045	.426	1.471
15-inch diameter.....	1.311	.621	1.932
18-inch diameter.....	1.493	.716	2.209
21-inch diameter.....	1.867	1.126	2.993
24-inch diameter.....	2.111	1.159	3.270
Storm-water receiving basins, each.....	53.517	29.30	82.817

TABLE NO. 12.—Average cost of constructing pipe sewers for 15 years.

Year.	8-inch diameter.		10-inch diameter.		12-inch diameter.		15-inch diameter.		18-inch diameter.		21-inch diameter.		24-inch diameter.	
	La- bor.	Ma- te- rial.	La- bor.	Ma- te- rial.	La- bor.	Ma- te- rial.	La- bor.	Ma- te- rial.	La- bor.	Ma- te- rial.	La- bor.	Ma- te- rial.	La- bor.	Ma- te- rial.
1902.....	\$0.83	\$0.32	\$0.97	\$0.41	\$1.04	\$0.46	\$1.46	\$0.62	\$1.74	\$0.78	\$1.91	\$0.96	\$2.43	\$1.23
1903.....	.80	.36	1.03	.53	1.09	.54	1.32	.73	1.52	.81	1.57	1.06	1.74	1.32
1904.....	.97	.36	.92	.55	1.17	.65	1.45	.81	1.61	.91	1.94	1.24	2.24	1.47
1905.....	.98	.38	.96	.55	1.19	.60	1.41	.77	1.45	.89	1.92	1.01	1.87	1.43
1906.....	.87	.43	1.19	.47	1.26	.54	1.41	.67	1.53	.78	1.88	.98	2.45	1.24
1907.....	1.42	.43	1.43	.48	1.30	.56	1.46	.70	1.82	.85	2.09	1.18	2.78	1.26
1908.....	1.34	.42	1.26	.50	1.44	.61	1.69	.75	1.91	.90	1.74	1.14	3.65	1.50
1909.....	1.34	.36	1.16	.36	1.46	.46	1.59	.56	1.58	.62	1.67	1.07	1.91	1.18
1910.....	1.00	.29	.99	.35	1.12	.43	1.19	.52	1.49	.66	1.52	.85	1.72	1.14
1911.....	1.01	.27	1.02	.32	1.17	.40	1.36	.52	1.64	.67	1.50	.75	1.82	1.08
1912.....	1.06	.25	1.08	.33	1.20	.39	1.46	.56	1.63	.67	1.70	.88	1.76	.98
1913.....	1.02	.26	1.07	.29	1.35	.38	1.53	.58	1.74	.75	1.93	1.08	2.20	1.28
1914.....	.78	.28	1.08	.45	1.32	.51	1.44	.69	1.56	.89	1.69	1.34	2.11	1.41
1915.....	.58	.19	1.12	.42	1.25	.51	1.56	.67	1.63	.89	1.89	1.18	1.78	1.45
1916.....	.76	.25	1.00	.36	1.05	.43	1.31	.62	1.49	.72	1.87	1.13	2.11	1.16

TABLE NO. 13.—Contract prices for construction materials for 15 years.

Year.	Cement, per barrel.	Sand, per cubic yard.	Gravel, per cubic yard.	Terra-cotta pipe, linear foot.						
				8-inch.	10-inch.	12-inch.	15-inch.	18-inch.	21-inch.	24-inch.
1902.....	\$1.82	\$0.65	\$0.88	\$0.115	\$0.17	\$0.205	\$0.275	\$0.39	\$0.59	\$0.77
1903.....	1.96	.55	.87	.12	.185	.235	.33	.42	.62	.80
1904.....	1.75	.85	.85	.12	.228	.297	.401	.5049	.7425	.965
1905.....	1.13	.81	.85	.14	.20	.29	.40	.50	.74	.96
1906.....	1.35	.85	1.05	.122	.1647	.2236	.2997	.3672	.5454	.7263
1907.....	1.55	.74	.97	.155	.195	.261	.353	.443	.5454	.848
1908.....	1.52	.84	1.04	.155	.225	.30	.405	.51	.75	.975
1909.....	1.20	.55	.75	.155	.1707	.239	.3233	.4066	.5975	.7775
1910.....	.975	.54	.65	.125	.15	.20	.27	.3825	.5625	.73125
1911.....	.99	.395	.485	.115	.175	.22	.30	.42	.55	.715
1912.....	.98	.345	.435	.121	.176	.22	.31	.40	.59	.715
1913.....	.94	.345	.435	.105	.15	.18	.351	.494	.78	.845
1914.....	1.11	.54	.69	.11	.256	.25	.432	.608	.96	1.04
1915.....	1.04	.54	.69	.11	.23	.245	.43	.60	.96	1.04
1916.....	1.00	.54	.69	.11	.16	.21	.284	.40	.63	.6825

TABLE NO. 14.—Maintenance work, sewerage system, for 10 years.

	1916	1915	1914	1913	1912
Main sewers cleaned.....feet..	3,743	4,885	1,113	4,525	4,071
Pipe sewers cleaned.....do....	156,733	156,773	145,767	123,545	122,838
Pipe sewers flushed.....do....	6,949,719	6,077,129	6,339,122	6,705,367	5,906,405
Manholes flushed.....do....	17,611	15,473	17,208	18,594	16,733
Sumps, regulators, gates cleaned and in- spected.....do....	2,102	3,618	4,222	3,949	2,245
Basins flushed.....do....	15,793	15,242	18,586	18,416	5,293
Basins cleaned.....do....	45,514	51,201	45,502	40,244	38,760
Sludge removed:					
Pipe sewers.....cubic feet..	5,220	4,499	4,079	3,723	2,479
Basins.....do....	198,128	191,928	160,660	168,696	147,741
Sediment chamber.....do....	71,500	71,100	62,856	66,744	53,140
Screens.....pounds.....	804,866	708,388	798,666	869,640	1,084,128
Main sewers inspected.....miles..	139.53	137.36	134.00	130.90	126.24
Pipe sewers inspected.....do....	1,316.00	1,150.00	1,200.00	1,270.00	491.47
Basins repaired.....do....	148	163	124	117	141

TABLE NO. 14.—*Maintenance work, sewerage system, for 10 years—Continued.*

	1911	1910	1909	1908	1907
Main sewers cleaned.....feet.....	300	1,185	11,624	13,723	24,724
Pipe sewers cleaned.....do.....	161,190	149,626	153,145	84,914	86,101
Pipe sewers flushed.....do.....	5,685,423	3,717,332	1,873,142	1,796,200	1,846,300
Manholes flushed.....do.....	15,994	11,943	5,295	6,093	2,351
Sumps, regulators, gates cleaned and inspected.....	530	568	11	8	8
Basins flushed.....do.....	11,950	18,884	2,829	-----	-----
Basins cleaned.....do.....	60,379	57,753	52,634	40,866	45,809
Sludge removed:					
Pipe sewers.....cubic feet.....	3,538	5,052	3,334	3,256	3,455
Basins.....do.....	166,428	190,204	188,460	277,319	347,598
Sediment chamber.....do.....	58,131	58,577	61,695	30,000	-----
Screens.....pounds.....	833,617	890,230	16,394	-----	-----
Main sewers inspected.....miles.....	122.78	114.00	114.00	-----	-----
Pipe sewers inspected.....do.....	469.42	448.78	346.00	340.00	350.00
Basins repaired.....do.....	155	249	123	88	99

TABLE NO. 15.—*Summary of sewerage system for 25 years.*

Fiscal year.	Total length.			Total cost.		Annual cost maintenance and operation.	
	Trunk sewers.	Pipe sewers.	All sewers.	Sewerage system. ¹	Sewage-disposal system.	Sewerage system.	Sewage-disposal system. ²
	<i>Miles.</i>	<i>Miles.</i>	<i>Miles.</i>				
1892.....	67.16	227.40	294.76	\$7,842,721.62	-----	\$42,000.00	-----
1893.....	68.37	238.45	306.82	8,007,721.62	-----	43,000.00	-----
1894.....	71.32	250.13	321.45	8,298,931.62	-----	45,000.00	-----
1895.....	74.48	260.20	334.68	8,476,431.62	-----	45,000.00	-----
1896.....	77.65	270.28	347.93	8,661,731.62	-----	45,000.00	-----
1897.....	81.36	284.06	365.42	8,901,731.62	-----	45,000.00	-----
1898.....	83.92	298.91	382.33	9,047,731.62	-----	50,000.00	-----
1899.....	85.65	307.36	393.01	9,183,731.62	-----	50,000.00	-----
1900.....	88.30	317.20	405.50	9,309,731.62	-----	50,000.00	-----
1901.....	90.89	327.86	418.75	9,515,731.62	-----	50,000.00	-----
1902.....	93.49	338.13	431.62	9,696,731.62	-----	58,000.00	-----
1903.....	96.31	351.73	448.04	9,817,731.62	-----	58,000.00	-----
1904.....	99.12	357.70	456.82	9,940,731.62	-----	58,000.00	-----
1905.....	103.21	365.60	468.81	10,040,881.62	-----	58,000.00	-----
1906.....	109.09	375.26	484.35	10,128,881.62	-----	42,000.00	-----
1907.....	112.20	389.24	501.44	10,363,881.62	\$3,714,823.00	38,000.00	\$37,295.00
1908.....	113.94	407.24	521.18	10,536,681.62	3,952,768.65	44,500.00	\$38,625.00
1909.....	117.24	424.02	541.26	10,688,681.62	4,031,888.27	45,000.00	58,000.00
1910.....	119.20	448.78	567.98	10,860,556.62	4,095,630.70	48,500.00	58,000.00
1911.....	122.78	469.42	592.20	11,204,188.79	4,146,228.01	50,000.00	58,000.00
1912.....	126.01	492.52	618.53	11,539,374.28	4,228,555.94	50,000.00	59,500.00
1913.....	130.90	513.38	644.28	11,922,177.04	4,366,524.43	50,000.00	59,500.00
1914.....	133.50	527.99	661.49	12,470,940.74	4,405,830.13	50,500.00	62,000.00
1915.....	137.36	544.75	682.11	13,032,082.86	4,624,186.31	50,500.00	64,000.00
1916.....	139.53	562.53	702.06	13,294,695.25	4,671,279.19	50,000.00	64,500.00

¹ Exclusive of sewage-disposal system.² The sewage-disposal system went into operation July 1, 1906.³ Handling a part of the sewage only during these years.TABLE NO. 16.—*Rights of way acquired for sewer extensions, fiscal year 1916.*

For separate system outlet sewer (upper Anacostia interceptor) through property of the Baltimore & Ohio Railroad Co., just south of Polk Street NE., Baltimore & Ohio Railroad Co., owner of record.¹

For separate system service sewer (upper Potomac interceptor) through parcel 25/31, vicinity Wisconsin Avenue and Fessenden Street NW.²

For separate system service sewer (upper Potomac interceptor) through parcel 25/24, vicinity Wisconsin Avenue and Forty-second Street NW.²

For separate system service sewer (upper Potomac interceptor) through parcel 25/14, vicinity Wisconsin Avenue and Forty-second Street NW.²

¹ Permit, not recorded.² Voluntary dedication.

For combined system outlet, Hawes Run trunk sewer (Anacostia main interceptor) through parcel 211/13, vicinity Hawes Run SE.¹

For separate system service sewer (east side interceptor) through parcel 155/3, vicinity Twentieth and Franklin Streets NE.²

For separate system service sewer (east side interceptor) through parcel 155/4, vicinity Twentieth and Franklin Streets NE.³

For separate system service sewer (east side interceptor) through parcel 155/89, vicinity Eighteenth and Franklin Streets NE.³

For separate system outlet sewer (upper Anacostia interceptor) through property of the Philadelphia, Baltimore & Washington Railroad Co., just south of Polk Street NE.; Philadelphia, Baltimore & Washington Railroad Co., owner of record.⁴

For separate system service sewer (east side interceptor) through parcel 165/32, in line of Twenty-seventh Street NE., near Vista Street.³

For separate system trunk sewer (Anacostia main interceptor) through property of the Baltimore & Ohio Railroad Co., just south of Bennings Road NE., Baltimore & Ohio Railroad Co., owner of record.⁴

For combined system trunk sewer (Rock Creek main interceptor) through parcel 55/90, vicinity Macomb Street and Reno Road NW.³

For Anacostia main intercepting sewer through parcel 169/1, vicinity Bennings Road NE.¹

For storm-water outlet sewer (Rock Creek main interceptor) through lot 56 of square 2995, vicinity Illinois Avenue and Jefferson Street NW.¹

For separate system sewer for service of Bennings abattoir (Anacostia main interceptor) through parcel 168/5, vicinity Bennings Road NE.³

For separate system trunk sewer (Anacostia main interceptor) through parcel 169/7, vicinity Bennings Road NE.⁵

For separate system service sewer (east side interceptor) through lots 5 and 6, square 4211, vicinity Twentieth and Girard Streets NE.¹

For separate system sewer lateral from Bureau of Standards (Rock Creek main interceptor) through parcel 44/18, vicinity Idaho Avenue and Van Ness Street NW.³

For separate system sewer for service of Bennings abattoir (Anacostia main interceptor) through parcel 168/2, vicinity Bennings Road NE.³

For separate system service sewer (Anacostia main interceptor) through parcel 218/19, vicinity Nineteenth and P Streets SE.³

For separate system trunk sewer (Anacostia main interceptor) through parcel 168/2, vicinity Bennings Road NE.³

For Anacostia main intercepting sewer and combined system trunk outlet sewers at Ely's Run, Blaine Street, and Scagg's Branch (Anacostia main interceptor) through parcel 168/7, along the eastern shore of Anacostia River, south of Bennings Road.¹

For separate system service sewer (east side interceptor) through parcel 155/5, vicinity Eighteenth and Franklin Streets NE.³

For separate system outlet sewer (east side interceptor) through lot 2, square 4316, vicinity Rhode Island Avenue and Monroe Street NE.¹

For sanitary outlet intercepting sewer (Rock Creek and B Street interceptor) through lot of 21, square E. 1264, vicinity Rock Creek and Q Street NW.¹

For combined system outlet, College Pond trunk sewer (upper Potomac interceptor), through property of the Baltimore & Ohio Railroad Co., west of Aqueduct Bridge; Baltimore & Ohio Railroad Co., owner of record.⁴

For separate system service sewer (Anacostia main interceptor) through parcel 218/16, vicinity Nineteenth and P Streets SE.⁶

For separate system service sewer (Anacostia main interceptor) through parcel 218/17, vicinity Nineteenth and P Streets SE.⁶

For separate system service sewer (Anacostia main interceptor) through parcel 218/18, vicinity Nineteenth and P Streets SE.⁶

For combined system Piney Branch trunk sewer (Rock Creek main interceptor) through lots 1 to 7, inclusive, square 3007, vicinity of Ninth and Gallatin Streets NW.⁶

For combined system Piney Branch trunk sewer (Rock Creek main interceptor), through lots 5, 7, and 8, square 3004, vicinity of Ninth and Gallatin Streets NW.⁶

For separate system outlet sewer (outfall sewer) through parcel 234/27, vicinity Milwaukee Place SE.⁶

For storm-water outlet sewer (Tiber Creek and New Jersey Avenue trunk) through lot of 5, square 796, vicinity Third Street and Virginia Avenue SE.⁶

For combined system outlet sewer through parking on east side of Sixth Street SW., northward from Maine Avenue, the property of the United States Government.⁴

¹ Consideration paid.

² Revocable license, not recorded.

³ Voluntary dedication.

⁴ Permit, not recorded.

⁵ Consideration not yet paid.

⁶ Consideration paid by condemnation.

TABLE NO. 17.—*Electric conduits laid July 1, 1915, to July 1, 1916.*

Number of ducts.	Washington Rail- way & Electric Co.		Potomac Electric Power Co.		Capital Traction Co.	
	Conduit.	Duct.	Conduit.	Duct.	Conduit.	Duct.
	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>
1.....			4,926	4,926		
2.....	15	31	5,677	11,354		
3.....						
4.....			23,986	95,944		
6.....			26	158		
8.....			6,074	48,590		
12.....			183	2,194		
14.....					49	686
15.....					28	428
16.....					78	1,251
32.....					950	30,400
36.....					125	4,500
44.....			22	990		
Total.....	15	31	40,894	164,156	1,230	37,265

Number of ducts.	Chesapeake & Poto- mac Telephone Co.		Western Union Tel- egraph Co.		Postal Telegraph- Cable Co.		Total.	
	Conduit.	Duct.	Conduit.	Duct.	Conduit.	Duct.	Conduit.	Duct.
	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>
1.....	767	767	124	124	81	81	5,898	5,898
2.....	15,492	30,985	180	360			21,364	42,730
3.....			35	104			35	104
4.....	116	465	641	2,564			24,743	98,973
6.....	239	1,434					265	1,265
8.....	233	1,864					6,307	51,451
12.....					283	3,391	466	5,585
14.....							49	686
15.....							28	428
16.....							78	1,251
32.....							950	30,400
36.....							125	4,500
44.....							22	990
Total.....	16,847	35,515	980	3,152	364	3,472	60,330	243,591

TABLE NO. 18.—*Electric conduits; lengths laid by sizes to July 1, 1916.*

Number of ducts.	Washington Rail- way & Electric Co.		Potomac Electric Power Co.		Capital Traction Co.		Chesapeake & Poto- mac Telephone Co.	
	Conduit.	Duct.	Conduit.	Duct.	Conduit.	Duct.	Conduit.	Duct.
	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>
1.....			77,275	77,275			53,765	53,765
2.....	28	57	154,210	308,421	15,742	31,484	296,919	593,837
3.....			236	708			5,832	17,496
4.....	33,398	133,592	485,489	1,941,955	22,681	90,724	180,049	720,196
5.....								
6.....	5,117	30,702	46,100	276,602	8,174	49,044	95,914	575,487
7.....					29	203	82	574
8.....	19,086	152,688	96,320	770,560	15,214	121,712	52,242	417,936
9.....			7,325	65,925			114	1,026
10.....	8,275	82,750	121	1,210	32	320	22,364	223,640
12.....	11,458	137,496	50,836	610,036	908	10,896	11,336	136,032
13.....			374	4,822			212	2,756
14.....	1,880	26,320	1,224	17,136	4,306	60,284	3,831	53,634
15.....			68	1,020	28	428		
16.....			4,998	79,960	479	7,667	8,037	128,592
17.....							636	10,812
18.....	2,214	39,852					4,149	74,682
20.....			562	11,240	830	16,600	1,407	28,140
22.....	134	2,948			9,109	200,398	823	18,106
24.....			3,176	76,224			2,270	54,480

TABLE NO. 18.—*Electric conduits; lengths laid by sizes to July 1, 1916—Continued.*

Number of ducts.	Washington Railway & Electric Co.		Potomac Electric Power Co.		Capital Traction Co.		Chesapeake & Potomac Telephone Co.	
	Conduit.	Duct.	Conduit.	Duct.	Conduit.	Duct.	Conduit.	Duct.
	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>
25.....							304	7,600
26.....					280	7,280		
28.....	87	2,436	2,174	60,872				
30.....			53	1,590			313	9,390
32.....			77	2,404	950	30,400	485	15,520
36.....			3,854	138,744	125	4,500	26	936
38.....	193	7,334						
40.....							1,589	63,560
44.....			446	19,646				
56.....							749	41,944
58.....			7	406				
64.....			106	6,784			176	11,264
70.....							53	3,710
72.....							118	8,496
82.....							35	2,870
Total.....	81,870	616,175	935,032	4,473,640	78,888	631,940	743,831	3,276,482

Number of ducts.	Western Union Telegraph Co.		Postal Telegraph Cable Co.		Total.	
	Conduit.	Duct.	Conduit.	Duct.	Conduit.	Duct.
	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>
1.....	217	217	15,378	15,378	146,635	146,635
2.....	3,409	6,817	1,045	2,090	471,353	942,706
3.....	6,975	20,924			13,043	39,128
4.....	7,936	31,744	34,001	136,004	763,554	3,054,216
5.....	4,177	20,885			4,177	20,885
6.....	4,232	25,392	17,313	103,878	176,851	1,061,105
7.....					111	777
8.....			1,140	9,120	184,002	1,472,016
9.....					7,439	66,951
10.....	183	1,830			30,975	309,750
12.....			283	3,391	74,821	897,851
13.....	309	4,017			895	11,635
14.....					11,241	157,374
15.....	44	660			140	2,108
16.....					13,514	216,219
17.....					636	10,812
18.....					6,363	114,534
20.....					2,799	55,980
22.....					10,066	221,452
24.....					5,446	130,704
25.....					304	7,600
26.....					280	7,280
28.....					2,261	63,308
30.....					366	10,980
32.....					1,512	48,384
36.....					4,005	144,180
38.....					193	7,334
40.....					1,589	63,560
44.....					416	19,646
56.....					749	41,944
58.....					7	406
64.....					282	18,048
70.....					53	3,710
72.....					118	8,496
82.....					35	2,870
Total.....	27,481	112,486	69,160	269,861	1,936,261	9,380,584

This table does not include 9,550.7 feet of United States Government conduit, 7,915 feet of United States Government pipe lines, 216 feet of Washington & Old Dominion Railway Co. conduit, 879.5 feet of Washington Market Co. pipe lines, 645.6 feet of private conduit, and 457 feet of 7 by 8 feet subway, 110 feet of 7 by 6 feet subway, and 87.6 feet of 3 by 2.2 feet subway laid by the United States Government.

TABLE NO. 19.—*Electric conduits; lengths laid each year to July 1, 1916.*

Fiscal year.	Washington Railway & Electric Co.		Potomac Electric Power Co.		Capital Traction Co.	
	Conduit.	Duct.	Conduit.	Duct.	Conduit.	Duct.
	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>
Laid prior to Mar. 27, 1900.....	75,742	569,333	342,786	1,812,108	47,687	389,220
1901.....	88	704	16,387	65,952	.....	.....
1902.....	.....	.....	8,098	89,958	.....	.....
1903.....	.....	.....	24,655	105,592	.....	.....
1904.....	.....	.....	15,635	65,412	.....	.....
1905.....	1,670	37,360	13,798	56,892	.....	.....
1906.....	.....	.....	50,057	287,311	.....	.....
1907.....	.....	.....	38,053	252,741	5,285	29,652
1908.....	.....	.....	39,705	154,940	23	92
1909.....	859	6,643	58,607	235,225	11,769	90,660
1910.....	420	1,800	46,097	159,420	263	1,788
1911.....	.....	.....	56,028	240,518	914	6,321
1912.....	42	168	63,842	336,390	9,416	58,542
1913.....	.....	.....	39,884	146,121	2,300	18,400
1914.....	34	136	45,018	170,580	.....	.....
1915.....	.....	.....	35,487	130,388	1,231	37,265
1916.....	15	31	40,894	164,156	.....	.....
Total.....	81,870	616,175	935,032	4,473,640	78,888	631,940

Fiscal year.	Chesapeake & Potomac Telephone Co.		Western Union Telegraph Co.		Postal Telegraph Cable Co.	
	Conduit.	Duct.	Conduit.	Duct.	Conduit.	Duct.
	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>
Laid prior to Mar. 27, 1900.....	79,920	698,920	.....	.....	14,702	14,702
1901.....	876	4,690	.....	.....	.....	.....
1902.....	.....	.....	.....	.....	.....	.....
1903.....	123,604	640,448	.....	.....	.....	.....
1904.....	35,905	138,649	.....	.....	.....	.....
1905.....	39,409	147,002	.....	.....	.....	.....
1906.....	80,433	278,693	10,615	44,975	.....	.....
1907.....	75,110	281,405	10,383	1,710	.....	.....
1908.....	58,005	228,725	11,463	51,775	.....	.....
1909.....	45,919	172,772	2,322	7,315	.....	.....
1910.....	56,882	140,859	329	652	.....	.....
1911.....	44,823	297,760	.....	.....	531	531
1912.....	19,966	45,698	.....	.....	50,238	232,992
1913.....	22,981	64,632	.....	.....	2,915	15,704
1914.....	24,391	51,779	627	1,234	.....	.....
1915.....	19,059	48,936	763	1,474	410	2,400
1916.....	16,848	35,514	979	3,151	364	3,472
Total.....	743,831	3,276,482	27,481	112,486	69,160	269,861

TABLE NO. 20.—*Gas mains; lengths laid, by sizes, July 1, 1915, to July 1, 1916.*

Size of main.	Washington Gas Light Co.	Georgetown Gas Light Co.	Total.
	<i>Linear feet.</i>	<i>Linear feet.</i>	<i>Linear feet.</i>
4-inch.....	13,453.4	8,512.1	21,965.5
6-inch.....	10,720.8	3,257.2	13,978.0
8-inch.....	1,686.5	13,171.0	14,857.5
12-inch.....	1,363.6	.....	1,363.6
20-inch.....	2,040.8	.....	2,040.8
30-inch.....	312.0	.....	312.0
Total.....	29,577.1	24,940.3	54,517.4

TABLE NO. 21.—Gas mains; lengths laid, by sizes, July 1, 1906, to July 1, 1916.

Size of main.	Washington Gas Light Co.	Georgetown Gas Light Co.	Total.
	<i>Linear feet.</i>	<i>Linear feet.</i>	<i>Linear feet.</i>
1½-inch.....	9,298	3,120	12,418
2-inch.....	5,073	1,485	6,558
3-inch.....	5,798	.....	5,798
4-inch.....	201,414	40,316	241,730
6-inch.....	233,694	56,600	290,294
8-inch.....	13,796	32,688	46,484
10-inch.....	5,365	4,107	9,472
12-inch.....	73,919	35,420	109,339
20-inch.....	3,959	234	4,193
24-inch.....	10,312	.....	10,312
30-inch.....	9,571	.....	9,571
	312	.....	312
Total.....	572,511	173,970	746,481

TABLE NO. 22.—Gas mains; lengths laid each year, July 1, 1906, to July 1, 1916.

Fiscal year.	Washington Gas Light Co.	Georgetown Gas Light Co.	Total.
	<i>Linear feet.</i>	<i>Linear feet.</i>	<i>Linear feet.</i>
1907.....	36,605	8,450	45,055
1908.....	61,642	19,777	81,419
1909.....	83,692	25,498	109,190
1910.....	69,237	2,202	71,439
1911.....	48,192	10,983	59,175
1912.....	88,583	50,178	138,761
1913.....	61,234	11,688	72,922
1914.....	48,475	5,839	54,313
1915.....	45,274	14,415	59,690
1916.....	29,577	24,940	54,517
Total.....	572,511	173,970	746,481

REPORT OF THE MUNICIPAL ARCHITECT.

WASHINGTON, October 10, 1916.

SIR: I have the honor to forward herewith the seventh annual report of the office of the municipal architect for the fiscal year ending June 30, 1916.

During the year seven buildings were under construction, as follows:

Building.	Appropriation available.	Cost.	Completed.
New Central High School, No. 173, Eleventh and Thirtieth Streets, Florida Avenue and Clifton Street NW...	{ June 26, 1912 July 1, 1913 July 21, 1914 }	\$1,053,260.32	Sept. 5, 1916
Excavating.....		49,000.00	Sept. 17, 1914
Excavating, soiling, sodding, etc.....		16,057.55	{ May 19, 1916 July 1916 }
Dunbar High School, No. 174, First Street, between N and O Streets NW.....	{ June 26, 1912 July 1, 1913 July 21, 1914 }	259,326.25	July 22, 1916
Excavating and substructure.....		55,730.87	July 15, 1915
Pile driving.....		12,337.83	May 1, 1915
Heating and ventilating.....		63,283.18	July 5, 1916
Plumbing.....		13,160.00	Aug. 21, 1916
Electrical work.....		9,095.00	
Radial brick chimney.....		1,786.00	
Park View School, No. 175, west side of Warder Street, between Newton and Otis Streets NW.....	July 21, 1914	99,718.18	July 22, 1916
Heating and ventilating.....		13,051.00	June 1, 1916
Plumbing.....		5,770.00	June 15, 1916
Electrical work.....		1,170.00	
Hardware.....		1,087.28	

Building.	Appropriation available.	Cost.	Completed.
Western High School, No. 117, Thirty-fifth and R Streets NW	July 29, 1914	.....
Steel and iron work, concrete footings, floor slabs and roof, fireproof partitions, and repairing brick walls and partitions.....		\$50,211.31	May 21, 1915
Heating.....		17,670.00	Aug. 21, 1915
Electrical work.....		3,537.36	Aug. 11, 1915
Millwork, carpenter work, etc.....		30,516.58	Sept. 7, 1915
Plumbing.....		11,992.33	Sept. 29, 1915
Plastering.....		8,900.00	Sept. 7, 1915
Painting.....		6,309.32	Sept. 7, 1915
Electrical fixtures.....		1,128.00	Sept. 29, 1915
Clock and bell system and electrical work.....		1,490.00	
Blackboards.....		617.40	
Powell School, No. 157, School Street, opposite Lamont Street NW., addition	July 1, 1915	57,601.00	Dec. 11, 1916
Heating and ventilating.....		13,568.00	Nov. 15, 1916
Electrical work.....		700.00	Dec. 18, 1916
Engine house No. 28, Connecticut Avenue, between Ordway and Porter Streets NW	July 21, 1914	23,854.90	Sept. 2, 1916
Plumbing.....		1,318.85	
Hardware.....		439.77	
Truck house No. 1, New Jersey Avenue, between D and E Streets NW	July 21, 1914	35,007.05	Sept. 15, 1916
Hardware.....		588.16	

Specifications and proposals were prepared for the following improvements:

Building.	Work.	Date of advertisement.
Curtis School.....	Retubing boiler.....	July 8, 1915
Grant School.....	Retubing boilers.....	July 9, 1915
Force School.....	Retubing boiler.....	July 10, 1915
Dennison School.....	Retubing boilers.....	Do.
Peabody School.....	do.....	July 16, 1915
Lincoln School.....	do.....	Do.
McKinley Manual Training School.....	Painting two smokestacks.....	July 20, 1915
Armstrong Manual Training School.....	Painting smokestack.....	Do.
M Street School power plant.....	do.....	Do.
Business High School.....	do.....	Do.
Industrial Home School.....	New boiler and appurtenances.....	July 22, 1915
Stevens School.....	Two new boilers.....	July 24, 1915
Garnet School.....	do.....	Do.
Cranch School.....	Retubing boiler.....	July 26, 1915
Gales School.....	Retubing boilers.....	Do.
Business High School.....	do.....	July 27, 1915
S. J. Bowen School.....	Retubing boiler.....	Do.
Tenley School.....	do.....	July 28, 1915
Wallach School.....	do.....	Do.
Brookland School.....	do.....	Do.
Franklin School.....	do.....	July 31, 1915
Eastern High School.....	Retubing boilers.....	Do.
Western High School.....	Electrical fixtures.....	Aug. 2, 1915
Emery School.....	Two new boilers.....	Do.
Engine house No. 21.....	Electrical work.....	Aug. 3, 1915
Truck house No. 5.....	do.....	Aug. 5, 1915
Engine house No. 12.....	Electric lights.....	Do.
Armstrong Manual Training School.....	Electrical work.....	Do.
Takoma Park Branch Public Library.....	Mosaic floor.....	Aug. 11, 1915
Engine house No. 27.....	Electrical work.....	Aug. 16, 1915
Syphax School.....	Retubing boiler.....	Aug. 18, 1915
Ketcham School.....	New fireproof stairways.....	Do.
Washington Asylum and Jail.....	Retubing boiler.....	Aug. 20, 1915
Park View School.....	Heating and ventilating system.....	Aug. 23, 1915
Do.....	Plumbing installation.....	Do.
Do.....	Electric lighting system.....	Do.
Weightman School.....	Four new hot-air furnaces.....	Do.
Western High School.....	Installation of composition blackboards.....	Aug. 31, 1915
District of Columbia Public Library.....	Elevator.....	Sept. 11, 1915
Residence Superintendent Tuberculosis Hospital.....	Installation of electrical work and fixtures.....	Sept. 16, 1915
Ketcham School.....	Carpenter work, ironwork, concrete and cement and miscellaneous work.....	Sept. 17, 1915

Building.	Work.	Date of advertisement.
Truck house No. 7.....	Electrical work.....	Sept. 20, 1915
Truck house No. 1.....	Construction.....	Sept. 25, 1915
Engine house No. 28.....	do.....	Oct. 7, 1915
Engine house No. 2.....	Electrical work.....	Oct. 12, 1915
M Street High School heating plant.....	do.....	Oct. 25, 1915
Convenience station No. 1.....	Remodeling building.....	Oct. 23, 1915
John Eaton School.....	Stair treads.....	Oct. 30, 1915
Police station No. 8.....	Electrical work.....	Nov. 6, 1915
Truck house No. 7.....	do.....	Do.
Powell School.....	Construction of addition to.....	Nov. 10, 1915
Joseph Rodman West School.....	Roof.....	Nov. 12, 1915
Emery School.....	Extension of smokestack.....	Dec. 4, 1915
Fire Department repair shop.....	Installation of window guards and gates.....	Dec. 18, 1915
Engine house No. 7.....	Electrical work.....	Jan. 5, 1916
Engine house No. 10.....	do.....	Do.
New Central High School.....	Excavating, filling, grading, soiling, and sodding.....	Jan. 11, 1916
Do.....	Water-closet partitions, promenade tile roofing, enamel tile work, window guards, drinking fountains, lavatory, etc.	Feb. 21, 1916
Western High School.....	Installation of clock and bell system and electrical work.....	Mar. 4, 1916
Powell School.....	Installation of plumbing system.....	Mar. 11, 1916
Do.....	Installation of electrical system.....	Do.
Do.....	Installation of heating, and ventilating system.....	Do.
Truck house No. 3.....	Lighting fixtures and extension of lighting system.....	Apr. 29, 1916
Truck house No. 4.....	Electrical work.....	May 3, 1916
Truck house No. 2.....	Heating system.....	May 4, 1916
Truck house No. 3.....	do.....	Do.
Truck house No. 4.....	do.....	Do.
Engine house No. 11.....	do.....	Do.
Engine house No. 10.....	Electrical work.....	May 29, 1916
Truck house No. 5.....	do.....	Do.
Dunbar High School.....	Tower clock.....	May 2, 1916
Congress Heights School.....	Construction of balustrade.....	June 5, 1916
New Central High School.....	Construction of platform rail galleries.....	June 6, 1916
Dunbar High School.....	do.....	Do.
Wallach School.....	New boiler equipment.....	June 8, 1916
Q Street Bridge site.....	Removal of frame buildings on approach.....	June 13, 1916
Municipal Lodging House.....	Electrical work.....	June 17, 1916
Public Schools.....	Repairs to furnaces.....	June 19, 1916
Western Market.....	Plumbing work.....	June 20, 1916
Eastern Market.....	do.....	Do.
New Central High School.....	About 59 orders were issued for the equipment of this building, aggregating about \$103,082.50.	
Dunbar High School.....	About 41 orders were issued for the equipment of this building, aggregating about \$88,342.58.	
New Central High School.....	Placing I beams over stage.....	
Do.....	Border light fixtures over stage.....	

CUBIC COST OF BUILDINGS.

In the annual reports of previous years the cubic cost of District buildings has been given since 1897. These tables show the increase in cost since 1898, which now amounts to an increase over the cost at that date of about 60 per cent. The following table shows the cubic cost of buildings erected during the fiscal year.

Comparison of cost between the District buildings and similar buildings in other cities will show that, with the exception of Cleveland, Ohio, the buildings and repairs cost less in Washington than in any other city.

Building, name, number, description, and location.	Cost.	Cubic contents.	Cost per cubic foot.	Heating plan.
		<i>Feet.</i>	<i>Cents.</i>	
New Central High School, No. 173, Eleventh, Thirteenth, and Clifton Streets and Florida Avenue NW.	\$1,053,260.32	5,712,462	\$0.1844	Fan system, steam.
Dunbar High School, No. 174, First Street, between N and O Streets NW.	414,719.13	2,913,295	.1423	Do.
Park View School, No. 175, west side of Warder Street, between Otis and Newton Streets.	120,796.46	829,417	.1456	Do.
Powell School, No. 157, addition, School Street, opposite Lamont Street, NW.	71,869.00	439,899.5	.146	Do.
Engine house, No. 28, Connecticut Avenue, between Ordway and Porter Streets NW.	25,613.52	131,805	.194	Steam.
Truck house, No. 1, New Jersey Avenue, between D and E Streets NW.	35,595.21	183,213.4	.194	Do.

The plans and specifications for all buildings appropriated for were completed and contracts made before the end of the fiscal year, with the exception of the fish market and the public convenience station at Fifteenth and H Streets NE. The plans and specifications for these buildings were completed before the end of the fiscal year, but, at the request of the Commission of Fine Arts, the plans were revised and are now about ready for proposals.

The two high schools were occupied by the school authorities and pupils on the opening day of the school term, October 2, 1916.

The Park View School was also completed and occupied on the opening day of the schools.

The Powell School will be completed and ready for occupancy about the 1st of December next.

The truck house, No. 1, on New Jersey Avenue, and engine house, No. 28, on Connecticut Avenue, will be ready for occupancy about the 1st of November, 1916.

I would renew the recommendations, made in previous annual reports for the last three years, for an increased force in this office and the repair shop, and for a reorganization on a more workable basis; and in this connection I would invite attention to the fact that the total expenses of this office, exclusive of heat, light, and quarters, but including superintendence, drafting, inspection, clerical, and all other personal expenses, amount to less than 4 per cent per annum of the cost of the buildings constructed each year.

The school buildings and other district buildings, which have heretofore been constructed at a cost of between 14 and 17 cents per cubic foot, on account of the great advance in wages and the continual advance in the prices of materials, will probably cost from 18 to 20 cents per cubic foot within the next year.

A property-accounting system has been established at the repair shop and other improvements made to expedite that branch of the work.

Heretofore it has been the practice to begin the repairs on the buildings, especially the schools, about the 20th of June, and about 80 per cent of the repairs was made during the summer months while the schools were closed. On account of the failure of the appropriation bill to pass until September, the repair work on the schools must be made during the winter with as little interference with the schools as possible.

I submit herewith the report of the superintendent of repairs, showing in detail the amount expended in repairs on each and every building under his supervision.

Very respectfully,

SNOWDEN ASHFORD,

Municipal Architect, District of Columbia.

Capt. R. G. POWELL,

Corps of Engineers, United States Army,

Assistant to the Engineer Commissioner.

REPORT OF THE SUPERINTENDENT OF REPAIRS.

WASHINGTON, September 13, 1916.

SIR: I have the honor to submit herewith the annual report of this office for the fiscal year ended June 30, 1916.

HENRY STOREY,

Superintendent of repairs, District of Columbia.

The MUNICIPAL ARCHITECT.

Public schools, District of Columbia, 1916—Repairs to buildings.

School.	Labor.	Material.	Contract.	Total.
Abbot.....	\$57.98	\$14.78	\$110.86	\$183.62
Adams.....	983.37	427.50	40.38	1,451.25
Addison.....	56.24	22.14	.77	79.15
Ambush.....	78.08	166.95	224.21	469.24
Amidon.....	160.05	38.54	.....	198.59
Armstrong.....	208.78	162.02	.....	370.80
Arthur.....	92.29	49.10	25.50	166.89
Banneker.....	219.26	151.35	176.07	546.68
Bell.....	54.73	14.73	.78	70.24
Benning.....	192.70	58.22	.....	250.92
Berret.....	20.55	9.91	14.80	45.26
Birney.....	178.52	50.03	.....	228.55
Blair.....	63.71	46.74	35.88	146.33
Blake.....	327.56	386.93	.....	714.49
Blow.....	87.42	19.16	15.11	121.69
A. Bowen.....	145.73	33.21	10.31	189.25

Public Schools, District of Columbia, 1916—Repairs to buildings—Continued.

School.	Labor.	Material.	Contract.	Total.
S. J. Bowen.....	\$164.89	\$28.04	\$145.14	\$338.07
Bradley.....	29.21	5.84	8.76	43.81
Brent.....	175.00	142.57	.....	317.57
Briggs.....	63.24	14.28	86.03	163.55
Brightwood.....	98.96	38.14	.....	137.10
Brightwood Park.....	760.64	455.00	11.47	1,227.11
Brookland.....	208.53	68.74	103.20	380.47
Brown.....	393.22	106.58	30.53	530.33
Bruce.....	85.16	36.70	15.42	137.28
Bryan.....	505.31	58.71	.....	564.02
Buchanan.....	111.19	173.99	10.62	295.80
Bunker Hill.....	60.22	25.20	21.78	107.20
Burrville.....	69.67	80.14	.....	149.81
Business High.....	1,087.50	1,089.58	611.00	2,788.08
Carbery.....	189.32	192.31	.93	382.56
Cardoza.....	140.38	29.99	.....	170.37
Cardoza Manual Training.....	67.84	16.24	.....	84.08
Chain Bridge.....	33.56	27.29	.....	60.85
Central High.....	667.98	321.15	137.00	1,126.13
Cleveland.....	209.38	106.95	.....	376.33
Conduit Road.....	10.25	.....	.....	10.25
Congress Heights and Annex.....	734.67	612.11	.....	1,346.78
H. D. Cooke.....	251.15	88.85	.....	340.00
J. F. Cook.....	607.01	304.90	17.67	929.58
Coreoran and Portable.....	403.09	91.59	13.33	508.01
Cranch.....	141.32	26.15	76.00	243.47
Crummell.....	89.84	55.62	.....	145.46
Curtis.....	207.19	94.72	147.20	449.11
Dennison.....	91.59	66.70	184.00	342.29
Deanwood.....	109.56	66.43	19.42	195.41
Dent.....	273.48	175.28	.....	448.76
Douglas.....	41.93	95.60	.....	137.53
Eastern High.....	851.14	568.50	213.50	1,633.14
Eaton.....	111.28	65.44	187.00	363.72
Eckington.....	282.73	298.80	.....	581.53
Edmonds.....	99.08	71.19	10.31	180.58
Emery.....	435.08	162.31	1,946.00	2,543.39
Fairbrother.....	84.09	28.73	.....	112.82
Fillmore.....	66.79	27.80	25.34	119.93
Force.....	797.41	155.11	104.00	1,056.52
Franklin.....	1,291.88	399.79	104.50	1,796.17
B. B. French.....	83.44	38.74	14.65	136.83
Gage.....	480.98	108.35	348.52	937.85
Gales.....	132.35	97.07	189.00	418.42
Garnet.....	223.30	98.25	1,546.54	1,868.09
Garfield.....	186.31	128.77	333.41	648.49
Garrison.....	89.01	99.60	26.81	215.42
Giddings.....	38.86	11.11	6.97	56.94
Grant.....	532.54	533.07	210.00	1,275.61
Greenleaf.....	327.02	207.84	15.65	550.51
Harrison.....	108.32	210.15	.77	319.24
Hayes.....	245.41	273.09	.....	518.50
Henry.....	285.19	161.04	106.55	552.78
Hilton.....	39.31	18.32	5.50	63.13
Hubbard.....	184.17	59.33	.....	243.50
Hyde.....	201.78	425.93	.....	627.71
Industrial Home.....	6.00	6.10	.....	12.10
Jackson.....	162.35	104.52	.78	267.65
Jefferson.....	440.25	314.89	112.00	867.14
Johnson and Annex.....	391.55	66.88	219.60	678.03
Jones.....	173.06	377.90	76.65	627.61
Kenilworth.....	1,947.01	668.88	11.31	2,627.20
Ketcham.....	599.67	191.23	3,301.71	4,092.61
Langdon.....	20.96	4.71	.....	25.67
Langston.....	281.22	59.24	.....	340.46
Lenox.....	699.02	269.66	9.14	977.82
Lincoln.....	130.24	65.21	150.50	345.95
Logan.....	408.72	362.99	36.27	807.98
Lovejoy.....	337.06	117.62	23.95	478.63
M Street High.....	549.01	342.60	.....	891.61
M Street Heating Plant.....	152.53	113.13	65.00	330.66
Madison.....	150.54	194.89	7.67	353.10
Magruder.....	197.48	212.62	.....	410.10
Maury.....	251.64	65.14	15.11	331.89
McCormick.....	36.49	21.37	4.03	61.89
McKinley Manual Training.....	545.40	740.79	.....	1,286.19
Military Road.....	8.18	1.27	.....	9.45
Miner Normal.....	296.08	108.97	.....	505.05
Monroe.....	684.99	464.49	.....	1,149.48
Montgomery.....	120.38	61.05	9.76	191.19
Morgan.....	99.76	26.32	29.68	155.76
Morse.....	154.37	72.05	23.02	249.44
New Mott.....	470.61	629.74	114.39	1,214.74
Old Mott.....	60.28	.....	.....	60.28
Ort.....	109.38	65.31	19.14	193.83

Public Schools, District of Columbia, 1916—Repairs to buildings—Continued.

School.	Labor.	Material.	Contract.	Total.
O Street Manual Training.....	\$36.88	\$9.99	.....	\$46.87
Park View Portable.....	79.07	46.34	.....	125.41
Patterson.....	340.95	107.97	.....	448.92
Ludlow.....	172.75	41.97	.....	214.72
Payne.....	182.47	123.15	\$19.54	325.16
Peabody.....	321.94	201.10	.....	766.99
Petworth.....	276.38	110.02	5.35	392.35
Phelps.....	64.35	19.41	.....	83.76
Phillips.....	38.02	16.12	23.02	77.16
Pierce.....	201.68	241.76	.....	443.44
Polk.....	156.60	209.65	7.60	373.85
Old Potomac.....	1.50	1.51	.....	3.01
Powell.....	509.13	446.45	217.44	1,173.43
Randall.....	141.15	74.85	7.97	223.97
Randle Highlands.....	1,146.45	176.31	323.64	1,646.40
Reno.....	57.45	26.32	110.82	194.59
Reservoir.....	44.53	49.64	.....	94.17
Ross.....	29.73	7.79	.....	37.52
Seaton.....	186.35	174.57	.....	360.92
Simmons.....	19.06	8.79	.....	27.85
Slater.....	65.65	113.26	.....	178.91
Fort Slocum.....	125.43	102.25	.....	227.68
Smallwood.....	124.87	58.65	11.70	195.22
Stanton.....	26.46	15.94	17.51	59.91
Smothers.....	19.47	13.07	.....	32.54
Stevens.....	585.67	427.02	1,547.52	2,560.21
Summer.....	173.92	88.11	.....	262.03
Syphax.....	292.58	82.48	127.80	502.86
Takoma.....	189.10	91.60	11.24	291.94
Taylor.....	389.60	352.05	7.67	749.32
Tenley and Annex.....	163.76	81.41	103.20	348.37
Thomson.....	131.31	56.35	200.57	388.23
Threlkeld.....	141.44	94.84	.....	236.28
Toner.....	170.56	205.95	50.53	427.04
Towers.....	52.44	29.72	34.33	116.49
Twinning.....	454.45	167.89	12.17	634.51
Tyler.....	108.49	38.29	.....	146.78
Van Buren and Annex.....	127.57	173.64	.....	301.21
Van Ness.....	178.07	245.87	.....	423.94
Wallach.....	702.51	450.10	2,647.00	3,799.61
Webb.....	49.01	13.46	2.40	64.87
Webster.....	198.88	107.95	.....	306.83
Weightman.....	783.51	1,571.43	.....	2,354.99
Western High.....	300.68	82.79	.....	383.47
West.....	221.20	141.10	305.12	667.42
Wheatley and Portable.....	201.40	92.10	.....	293.50
Wilson Normal.....	80.61	22.64	17.36	120.61
Wisconsin Avenue Manual Training.....	384.09	188.75	.....	572.84
Woodburn.....	46.49	7.15	.....	53.62
Wormley.....	35.18	9.52	.....	44.70
730 Twenty-fourth Street NW.....	61.44	19.85	37.36	118.65
District of Columbia repair shop.....	.....	2.50	.....	2.50
District of Columbia repair shop.....	139.03	68.05	.....	207.08
Various schools (on written orders in shop).....	10,158.18	1,745.18	.....	11,903.36

SUMMARY.

Appropriation.....	\$100,000.00
Running stock on hand June 30, 1915.....	17,524.39
Ten per cent on outside orders for superintendency.....	2,252.72
	119,777.11
Total amount of labor accounted for on written orders.....	\$48,432.75
Total amount of material accounted for on written orders.....	25,420.85
Total amount of minor contracts and shop orders.....	17,968.86
Gas consumed (pro rata share).....	43.80
Expressage on adding machine to Chicago to be repaired.....	2.98
Horseshoeing and blacksmith work done by shop.....	553.56
Allotment to engineer stables.....	295.00
Allotment to District of Columbia cement house.....	21.25
Allotment to District of Columbia property yards.....	21.25
Allotment to crane and office of District of Columbia sand yard.....	82.21
Pro rata share of purchase of horse (engineer department, 131,224).....	210.00
Purchase of forage.....	1,062.05
Pro rata share of purchase of blank forms (property accountability).....	66.83
Pro rata share of purchase of comptometer adding machine.....	207.50
Coal.....	273.59
Purchase of guides, drop cloths, flash lights, and 2 anemometers.....	145.32
Unexpended.....	636.91
Fractional differences in prices on material caused in issuing small quantities and the difference in prices of District of Columbia contract schedule for the fiscal years 1915-16.....	4,338.08
	99,782.79
Running stock on hand June 30, 1916.....	19,994.32

Fire department, District of Columbia, 1916—Repairs to engine houses.

House.	Labor.	Material.	Contract.	Total.
No. 1 engine.....	\$67.31	\$29.66	.....	\$96.97
No. 2 engine.....	53.25	12.77	.....	66.02
No. 4 engine.....	102.61	31.79	.....	134.40
No. 5 engine.....	385.02	204.94	.....	589.96
No. 6 engine.....	33.97	30.74	.....	64.71
No. 7 engine.....	332.24	304.80	.....	637.04
Fire department repair shop.....	60.06	77.95	.....	138.01
No. 8 engine.....	450.39	533.97	.....	984.36
No. 9 engine.....	275.08	141.70	.....	416.78
No. 10 engine.....	66.28	52.41	.....	118.69
No. 11 engine.....	151.76	81.01	.....	232.77
No. 12 engine.....	318.20	221.99	.....	540.19
No. 13 engine.....	203.25	26.36	.....	229.61
No. 14 engine.....	547.48	232.47	.....	779.95
No. 15 engine.....	142.44	87.51	.....	229.95
No. 16 engine.....	179.82	44.48	.....	224.30
No. 17 engine.....	54.00	52.00	\$90.00	196.00
No. 18 engine.....	105.83	26.07	.....	131.90
No. 19 engine.....	122.57	65.04	.....	187.61
No. 20 engine and No. 12 truck.....	252.84	69.47	.....	322.31
No. 21 engine and No. 9 truck.....	125.68	35.40	.....	161.08
No. 22 engine and No. 11 truck.....	236.92	93.30	.....	330.22
No. 23 engine.....	253.03	139.68	.....	392.71
No. 24 engine.....	27.15	27.98	.....	55.13
No. 25 engine and No. 8 truck.....	825.72	374.72	.....	1,200.44
No. 26 engine.....	53.31	48.19	.....	101.50
No. 27 engine and No. 1 chemical.....	109.99	88.11	.....	198.10
No. 2 chemical.....	84.27	21.94	.....	106.21
No. 1 truck.....	26.87	19.03	.....	45.90
No. 2 truck.....	255.81	77.58	.....	333.39
No. 3 truck.....	515.37	222.52	.....	737.89
No. 4 truck.....	25.42	35.09	30.00	90.71
No. 5 truck.....	185.51	134.80	.....	320.31
No. 6 truck.....	64.10	74.05	.....	138.15
No. 7 truck.....	103.46	51.22	.....	154.68
No. 10 truck.....	138.48	64.49	.....	202.97
Various engines (on written orders in shop).....	232.39	17.65	.....	250.04

SUMMARY.

Total amount of labor accounted for on written orders.....	\$7,167.88
Total amount of material accounted for on written orders.....	3,852.88
Total amount of minor contracts and shop orders.....	120.00
Allotment to engineer stables.....	45.00
Allotment to District of Columbia cement house.....	2.50
Allotment to property yards.....	2.50
Allotment to crane, District of Columbia sand yard.....	9.67
Pro rata share of purchase of horse (engineer department, 131,224).....	25.00
Pro rata share of purchase of blank forms (property accountability).....	7.86
Pro rata share of purchase of 1 comptometer adding machine.....	27.50
Purchase of forage.....	246.00
Gas consumed (pro rata share).....	5.80
Unexpended.....	278.26
	<u>11,790.85</u>
Appropriation.....	12,000.00
Expended.....	<u>11,790.85</u>
Credited school stock.....	209.15

Metropolitan Police, District of Columbia, 1916—Repairs to stations.

House.	Labor.	Material.	Contract.	Total.
No. 1 station.....	\$527.18	\$252.08		\$779.26
No. 2 station.....	81.60	15.47		97.07
No. 3 station.....	494.66	173.81		668.47
No. 4 station.....	174.02	88.21		262.23
No. 5 station.....	307.54	131.26		438.80
No. 6 station.....	287.61	219.55		507.16
No. 7 station.....	130.92	47.17		178.09
No. 8 station.....	567.50	307.47		875.17
No. 9 station.....	274.18	120.49		394.67
No. 10 station.....	175.90	81.26		257.16
No. 11 station.....	49.94	25.93		75.87
Tenley substation.....	377.34	141.33		518.67
Various stations (on written orders in shop).....	203.50	25.02		228.52

SUMMARY.

Total amount of labor accounted for on written orders.....	\$3,651.89
Total amount of material accounted for on written orders.....	1,629.25
Allotment to engineer stables.....	25.00
Allotment to cement house.....	1.25
Allotment to property yards.....	1.25
Allotment to crane and sand yard.....	4.84
Pro rata share of purchase of horse (engineer department, 131,224).....	12.50
Pro rata share of purchase of blank forms (property accountability).....	3.93
Pro rata share of purchase of 1 comptometer adding machine.....	15.00
Purchase of forage.....	123.00
(Gas consumed (pro rata share).....	3.17
Unexpended.....	321.94
	<u>5,793.02</u>
Appropriation.....	6,000.00
Expended.....	5,793.02
Credited to school stock.....	206.98

Courts, District of Columbia, 1916, Police court—Repairs to building.

Appropriation.....	\$1,000.00
Expended.....	990.09
Unexpended.....	9.91

Contingent and miscellaneous expenses, District of Columbia, 1916—Motor vehicles (municipal architect).

Allotment.....	\$600.00
Expended.....	593.69
Unexpended.....	6.31

Report of inspection of steam boilers, public schools.

School.	Date of inspection.	Remarks.
Armstrong Manual Training.....	Boilers Nos. 1 and 2, July 15, 1915. Boilers Nos. 3 and 4, July 15, 1915.	Good condition. Fair condition. Everlasting blow-off placed in line; also new steam gauge furnished.
Birney.....	Boilers Nos. 1 and 2, July 31, 1915.	Good condition.
S. J. Bowen.....	July 26, 1915.....	Tubes renewed. Reinforced manhole opening and caulked patch on girth seam. Condition fair.
Brightwood.....	June 10, 1915.....	Condition fair.
Brookland.....	July 28, 1915 (low pressure).....	Renewed valves on gauge and drilled and plugged two pits.
Do.....	Aug. 4, 1915 (high pressure).....	Tubes slightly pitted.
Business High.....	Boiler No. 1, July 21, 1915.....	Retubed. Fire-box sides repaired and valves put in feed line.

Report of inspection of steam boilers, public schools—Continued.

School.	Date of inspection.	Remarks.
Business High.....	Boiler No. 2, July 21, 1915....	Retubed. Valve stem on return repaired.
Do.....	Boiler No. 3, July 21, 1915....	Tubes renewed.
Central High.....	East boiler No. 1, June 19, 1915.	Condition poor.
Do.....	Center boiler No. 2, June 21, 1915.	Tubes renewed. Fire-box sides repaired; blow-off lines renewed.
Do.....	West boiler No. 3, June 21, 1915.	Condition poor.
Do.....	High pressure, Aug. 11, 1915.	Condition fair.
Congress Heights.....	Boilers Nos. 1 and 2, Aug. 2, 1915.	Condition good.
Cranch.....	Boiler No. 1, July 16, 1915....	Shells slightly pitted.
Do.....	Boiler No. 2, July 16, 1915....	Tubes renewed.
Curtis.....	Boiler No. 1, July 19, 1915....	Good condition.
Do.....	Boiler No. 2, July 7, 1915....	Tubes renewed.
Dennison.....	Boiler No. 1, July 9, 1915....	Tubes renewed. Condition fair.
Do.....	Boiler No. 2, July 9, 1915....	Do.
Eastern High.....	Boiler No. 1, July 31, 1915....	Tubes renewed.
Do.....	Boiler No. 2, July 31, 1915....	Do.
Emery.....	Boiler No. 1, July 9, 1915....	Two new boilers installed.
Force.....	Boiler No. 2, July 9, 1915....	Condition good.
Do.....	Boiler No. 1, July 31, 1915....	Tubes renewed. Condition good.
Franklin.....	Boiler No. 2, July 31, 1915....	Good condition.
Do.....	Boiler No. 1, July 12, 1915....	Tubes renewed.
Gales.....	Boiler No. 2, July 15, 1915....	Tubes renewed. Condition poor.
Garnet.....	Boiler No. 1, July 8, 1915....	Do.
Grant.....	Boiler No. 2, July 8, 1915....	Two new boilers installed.
Do.....	Boiler No. 1, June 9, 1915....	Tubes renewed. Condition fair.
Henry.....	Boiler No. 2, June 9, 1915....	Do.
Do.....	Boilers Nos. 1 and 2, July 26, 1915.	Do.
Jefferson.....	Boilers Nos. 1 and 2, July 14, 1915.	Good condition.
Lincoln.....	Boilers Nos. 1 and 2, Aug. 11, 1915.	Tubes renewed. Condition fair.
M Street Power Plant...	Boilers Nos. 1 and 2, Aug. 11, 1915.	Condition good.
McKinley.....	Boilers Nos. 1, 2, 3, 4, 5, and 6, July 15, 1915.	Repaired indirect heating coil; repaired fire-box sides and installed tile brick.
Do.....	Upright boiler, Aug. 11, 1915.	Condition good.
Miner Normal.....	Boilers Nos. 1 and 2, Aug. 4, 1915.	Repaired fire-box sides and linings.
Peabody.....	Boilers Nos. 1 and 2, July 13, 1915.	Tubes renewed.
Seaton.....	do.....	Good condition.
Stevens.....	Boilers Nos. 1 and 2, July 9, 1915.	Two new boilers installed.
Sumner.....	Boilers Nos. 1 and 2, July 9, 1915.	Put in new grates.
Syphax.....	Aug. 4, 1915.....	Tubes renewed. Condition fair.
Tenley.....	July 27, 1915.....	Tubes renewed.
Wallach.....	Boiler No. 1, July 14, 1915....	Put patch on girth seam.
Do.....	Boiler No. 2, July 14, 1915....	Put patch on girth seam and reinforced handhole plate.
Webster.....	Boilers Nos. 1 and 2, July 31, 1915.	Installed two sets of lower grates. Condition good.
Wilson Normal.....	Boilers Nos. 1 and 2.....	Repaired grates and fire-box sides. Condition good.

The following amounts were expended on the buildings named below in making repairs due to fire damage (appropriation, "Repairs to buildings injured by fire, District of Columbia, 1916"):

Cardozo Manual Training.....	\$388. 73
Central High.....	7. 95
No. 9 police station.....	39. 03

REPORT OF INSPECTOR OF BUILDINGS.

WASHINGTON, July 10, 1916.

SIR: I submit herewith the annual report covering the transactions of the building division during the fiscal year ended June 30, 1916. No operations of the Federal Government were reported during the year.

Statement showing the number and character of buildings, repairs, etc., for which permits issued from July 1, 1915, to June 30, 1916, and the respective values.

	Num- ber.	Value.		Num- ber.	Value.
Brick:			Concrete:		
Repairs.....	1,345	\$1,178,008	Garages.....	16	\$5,067
Dwellings.....	993	3,480,150	Warehouses.....	6	38,850
Apartments.....	60	4,396,000	Reservoir.....	1	500
Stores.....	51	481,944	Factory.....	1	30,000
Stores and dwellings.....	8	37,350	Storeroom.....	1	1,500
Stores and apartments.....	6	45,500	Metal:		
Office buildings.....	6	698,900	Garages.....	489	53,503
Warehouses.....	11	110,150	Sheds.....	43	33,850
Workshops.....	4	9,950	Oil tanks.....	2	9,000
Sheds.....	11	8,400	Frame:		
Theaters.....	2	100,000	Sheds.....	343	15,048
Factories.....	2	70,000	Repairs.....	455	81,258
Bank.....	1	15,000	Dwellings.....	306	1,040,239
Garages.....	296	521,826	Garages.....	97	14,662
Churches.....	6	159,200	Churches.....	2	2,850
College.....	1	115,000	Stores.....	2	1,500
Bakery.....	2	60,000	Factory.....	1	24,000
Nurses' home (Homeo- pathic Hospital).....	1	31,000	Stables.....	2	100
Studios.....	2	7,000	Elevators.....	92	215,185
Cemetery vault.....	1	4,500	Motors.....	318	82,031
Stables.....	3	4,504	Boilers.....	6	4,550
Wagon shed.....	1	3,000	Engines.....	2	350
Printing office.....	1	35,000	Gas engines.....	2	1,065
Laboratory.....	1	7,000	Total.....	5,075	13,477,120
Dairy.....	1	900	Awnings.....	141	10,575
Tile:			Signs.....	784	7,840
Dwellings.....	50	227,650	Grand total.....	6,000	13,495,535
Garages.....	21	5,850			
Church.....	1	4,500			

Comparative statement for the years 1915 and 1916.

	New buildings.	Repairs, etc.	Dwellings.	Apart- ments.	Business buildings.
1916.....	1,839	3,236	1,349	60	430
1915.....	1,486	3,368	1,155	42	289
Total.....	353	1 132	194	18	141

¹ Decrease.

Valuation of building operations, including awnings and signs:

1916.....	\$13,495,535
1915.....	8,599,932

Increase..... 4,895,603

Permits issued, number, including awnings, signs, etc.:

1916.....	5,797
1915.....	5,571

Increase..... 226

Projections beyond the building line, number of permits for:

1916.....	1,999
1915.....	1,760

Increase..... 239

The following summary shows the distribution of improvements in the respective sections of the District and the values of same:

	Buildings.	Repairs, etc.
Northeast.....	\$411,423	\$75,077
Southeast.....	252,610	50,195
Northwest.....	4,037,764	837,551
Southwest.....	105,655	101,347
County.....	6,983,979	621,519
Total.....	11,791,431	1,685,689
	1,685,689	
Sum total.....	13,477,120	

¹ Does not include awnings or signs, cost of which is estimated.

Grand total for all building operations..... \$13,495,535

Estimated number of buildings in the District of Columbia.

	Brick.	Frame.
1916, erected.....	1,529	310
1916, razed.....	138	171
Total.....	1,491	239
1915.....	62,099	26,337
Total estimated number.....	63,590	26,576

¹ The number of razed buildings represents only those buildings for the razing of which permits were issued. The number of buildings in the District, therefore, can be only broadly approximated, the estimate being calculated upon the basis that a new building succeeds one torn down, and that if one large building replaces several small ones, several small ones replace a large one.

This was the biggest year the building division has had since the year 1912. As will be noted there was a considerable increase in all classes of new buildings.

Notwithstanding the receipts for fees were \$4,650 more than taken in last year, and the expenses some \$200 less than last year, the receipts for fees just about equaled the pay roll of the office, but transportation and contingent expenses made the total expenses \$2,797.32 in excess of the receipts.

In this connection it is to be noted that a number of individuals and corporations refuse to pay fees for the quarterly inspection of elevators and the annual inspection of hotels and places of public amusement. This inspection work must be done, but the office does not receive any return for a large portion of it. It is earnestly hoped that the court may soon decide on the legality of these fees, for meanwhile it is not fair that some who desire to comply with all regulations should pay and others who dispute the propriety of the fee should receive the same service gratis. Had all the fees due the office been paid the expenses this year would have exceeded the receipts by only \$1,117.32.

The most important change in the building regulations during the past year was the revision of the section relating to reinforced concrete construction. Our regulations are now in accordance with approved practice.

The number of inspections made by the field force was somewhat greater than the previous year. The fire escape inspector examined all theaters and places of public amusement in the District of Columbia, as well as all hotels, public halls, etc., and all of the public schools.

The two elevator inspectors examined some 800 passengers elevators, all of these cars except those in private residences being inspected once every three months. This is the limit of these men's capacity for thorough work, and it is a question of but a short time when another inspector will be needed to take care of the increase in this class of inspection.

The building regulations are believed to be reasonable, and, as a matter of fact, there is little fault found with them, but the height of buildings law should be amended so as to correct the unfair and unsightly condition which arises at the intersection of streets of different width, where the height permitted on the wider street is allowed to extend an unlimited distance on the streets of lesser width. Also it is believed the

policy of dividing the city into zones for the purpose of regulating and restricting the location of buildings designed for specific uses should be considered by the commissioners and recommendation made to Congress to enact a law which, besides fixing the height of buildings, would also prohibit the establishment of stores or other business on purely residential streets.

As recommended in detail in the estimates certain deserved increases in compensation of employees in this division are strongly urged.

My acknowledgements are due the employees of the office for the work accomplished during the past year.

MORRIS HACKER,
Inspector of Buildings.

Capt. ROGER G. POWELL,
*Corps of Engineers, United States Army,
Assistant Engineer Commissioner, District of Columbia.*

REPORT OF THE INSPECTOR OF STEAM BOILERS.

WASHINGTON, D. C., *October 10, 1916.*

SIR: I have the honor to submit the following report for the fiscal year ending June 30, 1916, together with fees received and expenses incurred:

Boilers inspected.....	525
Boilers inspected for District of Columbia.....	65
Boilers condemned.....	6
Cases of scale and deposit.....	35
Cases of defective setting.....	10
Cases of defective steam gauges.....	15
Cases of defective tubes.....	25
Cases of defective shell plates.....	5
Total amount received.....	\$2,300.00
Total amount expended.....	325.00
Balance.....	1,975.00

Very respectfully,

E. F. VERMILLION,
Inspector of Steam Boilers, District of Columbia.

THE INSPECTOR OF BUILDINGS.

REPORT OF THE BOARD OF EXAMINERS OF STEAM ENGINEERS.

WASHINGTON, D. C., *September 21, 1916.*

SIR: We herewith submit to you the report of the board of examiners of steam engineers for the year ending June 30, 1916.

The following table shows the work as it progressed during each month:

	Meetings held.	Applicants received.	Applicants approved.	Applicants incompetent.	First class.	Second class.	Third class.	Special hoisting.	Duplicate.
1915.									
July.....	5	12	3	9	.....	.....	2	1	.....
August.....	4	8	3	5	.....	.....	2	1	.....
September.....	4	6	2	4	.....	.....	2	.....	.....
October.....	5	11	5	6	.....	.....	1	2	2
November.....	4	7	3	4	.....	1	2	.....	.....
December.....	5	5	3	2	.....	1	2	.....	.....
1916.									
January.....	4	7	3	4	.....	1	2	.....	.....
February.....	4	10	4	6	.....	.....	3	.....	.....
March.....	5	19	5	14	1	2	1	.....	1
April.....	4	7	2	5	.....	1	1	.....	.....
May.....	4	8	2	6	.....	.....	2	.....	.....
June.....	4	18	4	14	.....	.....	2	1	1
Total.....	53	118	39	79	2	6	22	5	4

In addition to examining applicants for steam engineer license, the board has also conducted the examination of applicants for automobile and motor cycle operators, a full report of which is being submitted by the secretary of the automobile board.

Our estimate of expenses for the year ending June 30, 1918, has been submitted to the secretary of the Board of Commissioners on the regular blank forms supplied for that purpose.

E. F. VERMILLION,
H. BOESCH,
JAS. T. FINK,
Board of Examiners.

The INSPECTOR OF BUILDINGS.

REPORT OF THE INSPECTOR OF PLUMBING.

WASHINGTON, October 1, 1916.

I have the honor to submit the thirty-fourth annual report of the work performed by the division of plumbing inspection for the fiscal year ended June 30, 1916. The following table shows the work performed by the outside force of assistant inspectors:

Preliminary inspections.....	7, 110
Cast-iron sewers:	
New.....	4, 473
Repairs.....	987
Terra-cotta sewers:	
New.....	37
Repairs.....	443
Main sewers tapped.....	1, 560
Rough work in—	
New houses.....	2, 561
Old houses.....	1, 780
Water services.....	783
Notices served.....	74
Peppermint tests and final inspections.....	2, 894
Work not ready for inspection when ordered.....	878
Changes ordered in work incorrectly installed.....	244
Special inspections of municipal work.....	40
Gas.....	2, 130
Complaints.....	5, 758
Total.....	31, 752

To the above are to be added inspections by the head of the office of a general nature, 2,208; special inspections on construction work for the District, 342; and by the principal assistant inspector of plumbing, examination of materials, visits to the homes of witnesses, and general police work which does not appear elsewhere, 1,440. The total of these inspections should be added to the above total, which gives a general total of 35,742 inspections made by the entire force.

The following table shows the total inspections made each year since the fiscal year 1895:

1895-96.....	8, 677	1906-7.....	32, 190
1896-97.....	14, 112	1907-8.....	29, 547
1897-98.....	15, 550	1908-9.....	39, 404
1898-99.....	17, 600	1909-10.....	44, 953
1899-1900.....	17, 405	1910-11.....	46, 035
1900-1901.....	19, 965	1911-12.....	45, 875
1901-2.....	32, 621	1912-13.....	41, 644
1902-3.....	25, 297	1913-14.....	37, 177
1903-4.....	25, 637	1914-15.....	37, 478
1904-5.....	27, 337	1915-16.....	35, 742
1905-6.....	30, 185		

It is estimated that the total cost of new plumbing work installed during the year was \$962,978, and the estimate of value of repairs and remodeling work is \$331,695, both of which are much greater than for last year. This is accounted for partly by increased building and partly by a better class of plumbing work generally.

The total number of inspections made by the outdoor force (31,752) divided by the total number of days in the field gives an average of 15 inspections per day per man. The greatest number of inspections made by any man in one day was 61.

PER DIEM EMPLOYEES.

With the exception of the men employed as temporary assistant inspectors, etc., under the special appropriation for that purpose, there were no other per diem employees in this office during the past year.

POLICE-COURT CASES.

The total number of warrants obtained was 15, divided as follows:

Violations of the plumbing regulations.....	5
Work done by unlicensed plumbers.....	10
Total.....	15

These cases were disposed of as follows:

Nolle prossed on compliance with commissioners' order.....	4
Forfeited collaterals.....	6
Fined.....	3
Personal bonds, to comply with regulations.....	1
Dismissed.....	1
Total.....	15

Amount collected from fines and forfeitures, \$75.

OFFICE WORK.

The following table gives the amount of office work performed during the past year and a comparison with that of the five preceding years:

	1911	1912	1913	1914	1915	1916
Official letters.....	2,542	2,340	1,915	1,138	877	845
Unofficial letters.....	5,240	4,973	4,138	3,679	3,957	3,642
Indorsements.....	2,905	2,204	2,118	1,177	1,180	1,300
Inspectors' reports.....	9,641	9,659	9,015	10,262	9,715	9,440
Indexes.....	1,223	1,404	1,683	1,771	1,332	1,400
Plans prepared.....	30	33	26	18	30	24
Specifications prepared.....	45	41	34	50	66	55
Plans and specifications revised.....	6	14	1	4	1	3
Examinations of plans for new buildings.....	2,273	3,256	1,857	1,518	1,486	1,361
Examination of repair applications.....	2,907	2,263	3,138	2,628	3,347	2,955
Postage stamps used:						
2-cent.....						1,582
1-cent.....						2,623
Postal cards.....						88
Car tickets used.....						1,766

REGULATIONS.

During the year but few changes were made in the regulations, all of the changes made looking to simplification and reduction of the total cost of plumbing to the householders.

COMPULSORY DRAINAGE.

During the last year 27 cases were recommended for compulsory sewer and water connections by the health department and other branches of the District government, including 2 nuisance notices. Notices were served in all these cases, with the exception of 3, where legal service could not be made. Fifteen of these notices were complied with by owners or agents and in 1 case the building was razed by the owner. On 3 of the cases the work was done by the District of Columbia and assessment made. The 8 remaining drainage notices are pending service.

PUBLIC CONVENIENCE STATIONS.

There were 3 public convenience stations in operation during the year, open from 6 a. m. until midnight, in 2 shifts of attendants, each working 9 hours per day. The station at Seventh and Pennsylvania Avenue accommodated 1,779,010; that at Thirteenth-and-a-half Street and Pennsylvania Avenue, 561,191; and at Ninth and K Streets, 782,747 patrons during the year, this being a total of 3,122,948. The female patronage was about 14 per cent of the total and they contributed 10 per cent of the

cash receipts. These receipts, amounting to \$3,098.16, were for the use of pay compartments, the furnishing of clean towels, shoe-shine concessions, etc.

The patronage of the stations is increasing year by year and demonstrates the urgent need of facilities of this character. This office has for several years recommended stations at the points where street traffic is most dense, such as in the vicinity of Ninth and F Streets NW., Fifteenth and New York Avenue NW., Wisconsin Avenue and M Streets NW., and near the Peace Monument, and it is urgently recommended that a definite policy of appropriating for one new station each year be adopted until these locations are provided for.

The work of the field and office forces for the past year has been well and promptly handled, and I beg to commend to you the loyalty and efficiency of the personnel.

A. R. MCGONEGAL,

Inspector of Plumbing, District of Columbia.

The INSPECTOR OF BUILDINGS.

REPORT OF THE PLUMBING BOARD.

WASHINGTON, October 1, 1916.

SIR: I have the honor to submit the following report of the work of the plumbing board for the past fiscal year:

There were held during the year 24 regular and two special sessions and consultations for examination and rating of candidates as master plumbers and gas fitters. The total number examined was 48.

The number of original candidates examined for licensing as master plumbers and gas fitters was 22, of whom 6 passed and 16 failed.

Of the 26 who had been previously examined for licensing as master plumbers and gas fitters, 1 passed and 25 failed.

Examination of candidates appearing before the board one or more times resulted as follows:

	Passed.	Failed.		Passed.	Failed.
First.....	6	16	Fifth.....	.....	1
Second.....	1	15	Sixth.....	.....	1
Third.....	.....	4	Seventh.....	.....	1
Fourth.....	.....	2	Eleventh.....	.....	1

On April 1, 1916, Richard A. O'Brien, secretary of the board, died. Samuel Tapp was appointed member and secretary of the board.

PETER C. SCHAEFER,
President.

SAMUEL TAPP,
Secretary.

The INSPECTOR OF PLUMBING.

REPORT OF THE ELECTRICAL ENGINEER.

WASHINGTON, October 10, 1916.

SIR: I have the honor to submit herewith the annual report of the Electrical Department for the fiscal year ended June 30, 1916.

Very respectfully,

WALTER C. ALLEN,
Electrical Engineer, District of Columbia.

Lieut. Col. CHAS. W. KUTZ,
*Corps of the Engineers, United States Army,
Engineer Commissioner, District of Columbia.*

STREET LIGHTING.

No increase in the appropriation for lighting for this fiscal year was granted by Congress, so that but few extensions of the lighting system could be made. The additional lamps that were established, as shown by the following tables, were erected after July 1, 1915, as a part of the work of the preceding fiscal year which was not completed on the latter date.

IMPROVED INCANDESCENT ELECTRIC LIGHTING.

This system was ordered for the following streets during the previous fiscal year, and was completed after July 1, 1915: Pennsylvania Avenue SE., from Second to Seventeenth Streets; Eighth Street SE., from Pennsylvania Avenue to M Street; Eleventh Street SE., from Pennsylvania Avenue to O Street; Seventh Street NW., from New York Avenue to Florida Avenue, Nichols Avenue SE., from Navy Yard Bridge to Sheridan Road. This work involved the erection of 528 lamps, of 100 candlepower each, over approximately 3.1439 miles of streets.

ARC LIGHTING.

The appropriation act for the fiscal year 1912 (sec. 7) required that all inclosed arc lamps in service on March 2, 1911, be replaced either with 4-ampere magnetite arc lamps, or with some other form of improved lighting to be selected by the commissioners, the changes to be made at the rate of not less than 400 lamps per annum, and to be completed by April 1, 1914. Acting under the interpretation of the provision of this law, which reads, "except as otherwise directed by the Commissioners of the District of Columbia," all lamps were not replaced by "4-ampere 320-watt magnetite, or other arc lamps of equal illuminating value," but in many cases were replaced by new forms of lighting which had been adopted later as standard for certain classes of streets. Under this provision the rate of replacement "of not less than 400 lamps per annum" was also varied from in the case of streets for which a new form of lighting was preferable but for the increased cost of which funds were not available. In such cases the changes were delayed until the next appropriation became available.

On March 2, 1911, there were 1,202 inclosed arc lamps in service in the streets in the District of Columbia, and seven of such lamps were added as a temporary measure on November 27, 1911. The following list gives the kinds of lamps by which these 1,209 inclosed arc lamps were replaced and the dates on which the changes went into effect:

Replaced by incandescent electric lamps:

May 9, 1911.....	5
Sept. 7, 1911.....	1
Sept. 21, 1911.....	42
Oct. 3, 1911.....	17
Oct. 6, 1911.....	12
Oct. 9, 1911.....	2
Oct. 10, 1911.....	5
Oct. 20, 1911.....	7
Oct. 23, 1911.....	36
Oct. 25, 1911.....	4
Oct. 26, 1911.....	1
Oct. 28, 1911.....	3
Oct. 30, 1911.....	36
Nov. 3, 1911.....	1
Nov. 8, 1911.....	19
Jan. 29, 1912.....	9
June 7, 1912.....	16
July 20, 1912.....	13
Aug. 9, 1912.....	38
Oct. 17, 1912.....	1
Dec. 12, 1912.....	3
Dec. 13, 1912.....	22
Dec. 21, 1912.....	30
Dec. 28, 1912.....	1
Jan. 21, 1913.....	3
Feb. 1, 1913.....	2
Feb. 3, 1913.....	5
July 3, 1913.....	2
June 9, 1914.....	22
July 20, 1914.....	45
Aug. 5, 1914.....	12
Aug. 11, 1914.....	16
Nov. 20, 1914.....	3
Dec. 3, 1914.....	38
Apr. 1, 1915.....	8

Replaced by incandescent electric lamps:

Apr. 7, 1915.....	30
May 11, 1915.....	29
June 15, 1915.....	44
Sept. 2, 1915.....	77
Sept. 8, 1915.....	1
Oct. 1, 1915.....	21
Total.....	673

Replaced by 4-ampere magnetite arc lamps:

Jan. 27, 1912.....	42
Mar. 13, 1912.....	45
Mar. 20, 1912.....	20
Mar. 26, 1912.....	83
Apr. 1, 1912.....	11
May 11, 1914.....	87
Jan. 11, 1915.....	35
Jan. 14, 1915.....	15
Jan. 15, 1915.....	10
Jan. 16, 1915.....	29
Total.....	377

Replaced by 6.6-ampere magnetite arc lamps:

June 26, 1911.....	8
Jan. 30, 1914.....	78
Nov. 13, 1914.....	1
Dec. 30, 1914.....	42
Jan. 19, 1915.....	3
Jan. 22, 1915.....	16
Jan. 23, 1915.....	5
Jan. 25, 1915.....	2
Apr. 23, 1915.....	4
Total.....	159

The replacement of the inclosed arc lamps by other forms of lighting was completed on October 1, 1915.

LIGHTS ALONG STEAM RAILROADS.

The situation with respect to the several suits brought by the District of Columbia against steam railroad companies to compel repayment for the sums expended by the District in maintaining lights along the respective rights of way of such companies is as follows:

Washington Terminal Co.—A verdict of the jury was obtained in favor of the District in the amount of \$10,223.22, covering the period from September, 1909, to November, 1911, both inclusive. Motion for a new trial was made, which has not yet been disposed of.

A third suit has been entered for \$10,553.23, for the period from December, 1911, to August, 1914, both inclusive.

Philadelphia, Baltimore & Washington Railroad Co.—Suit was filed on March 3, 1916, against this company for \$17,178.25, covering the period from March, 1913, to June, 1916, both inclusive.

This suit is now on the calendar awaiting trial.

Lamps of all kinds in service July 1, 1916, as compared with July 1, 1915.

Kind of light.	1915	1916
Mantle gas.....	10, 195	10, 248
Electric arc:		
6.6-ampere series, inclosed.....	99	317
6.6-ampere magnetite.....	320	317
4-ampere magnetite.....	522	523
Electric incandescent:		
250 candlepower, series.....	4	4
100 candlepower, series.....	2, 860	3, 428
100 candlepower, multiple.....	101	98
60 candlepower, series.....	3, 243	3, 323
60 candlepower, multiple.....	320	321
4 glower Nernst.....	64	64
Street designation lamps:		
Gas.....	391	388
Electric.....	82	91
Total.....	18, 201	18, 805

Net increase during year, 604 lamps.

During the year the following changes have been made in the various forms of street lamps:

Kind of light.	Added.	Discontinued.
Mantle gas.....	134	81
Electric arc:		
6.6-ampere series, inclosed.....		99
6.6-ampere magnetite.....	2	5
4-ampere magnetite.....	1	
Electric incandescent:		
100 candlepower, series.....	¹ 570	2
100 candlepower, multiple.....		3
60 candlepower, series.....	² 124	44
60 candlepower, multiple.....	1	
Street designation lamps:		
On fire-alarm posts—		
Gas.....	98	3
Electric incandescent.....	10	
On patrol posts, gas.....		1
On plain posts—		
Gas.....	7	7
Electric incandescent.....		1
Total.....	850	246

¹ These lamps replaced 54 mantle gas lamps, ninety-nine 6.6-ampere series inclosed arc lamps, thirty-seven 60-candlepower incandescent electric lamps, and three 100-candlepower incandescent electric multiple lamps.

² In the establishment of these lamps 12 mantle gas lamps were replaced.

³ In the establishment of these lamps 3 designation fire-alarm gas lamps were replaced.

Net increase during the year, 604 lamps.

SUMMARY OF CHANGES.

Net increase in number of lamps.....	604
Discontinued.....	38
Replaced by other kinds.....	208
Total changes.....	850

Cable installed and withdrawn during the year and amount in service June 30, 1916.

INSTALLED.

Size of cable.	Signal.		Telephone.		Combination.						Total.			
	Cable.	Conductors, No. 14, Brown & Sharpe.	Cable.	Conductors (Brown & Sharpe).		Conductors (Brown & Sharpe).								
				No. 10.	No. 22.	Cable.	No. 14.		No. 19.		Cable.	No. 14.	No. 19.	No. 22.
							Pairs.	Conductors.	Pairs.	Conductors.				
	<i>Fet.</i>	<i>Fet.</i>	<i>Fet.</i>	<i>Fet.</i>	<i>Fet.</i>	No.	<i>Fet.</i>	No.	<i>Fet.</i>	<i>Fet.</i>	<i>Fet.</i>	<i>Fet.</i>	<i>Fet.</i>	<i>Fet.</i>
30 pair.....					685	10	13,700	20	27,400	685	13,700	27,400		
25 pair.....					2,391	10	47,820	15	71,730	2,391	47,820	71,730		
12 pair.....					3,894	6	46,728	6	46,728	3,894	46,728	46,728		
8 pair.....	200	6,900			17,364	4	138,912	4	138,912	17,364	138,912	138,912		
5 pair.....					648	2	3,888	2	2,592	648	3,888	2,592		
3 pair.....					90	2	360	1	180	90	360	180		
Total.....	200	6,900			25,072	.....	251,408	.....	287,542	25,362	258,968	287,542		

WITHDRAWN.

Size of cable.	Signal.		Telephone.		Combination.				Total.				
	Cable.	Conductors, No. 14, Brown & Sharpe.	Cable.	Conductors (Brown & Sharpe).	Cable.	Conductors (Brown & Sharpe).			Cable.	Conductors (Brown & Sharpe).			
						No. 14.	No. 19.			No. 14.	No. 19.	No. 22.	
							Pairs.	Conductors.					
	<i>Fet.</i>	<i>Fet.</i>	<i>Fet.</i>	<i>Fet.</i>	<i>Fet.</i>	<i>Fet.</i>	No.	<i>Fet.</i>	<i>Fet.</i>	<i>Fet.</i>	<i>Fet.</i>	<i>Fet.</i>	
30 pair.....					135	2,700	20	5,400	135	2,700	5,400		
12 pair.....					406	4,772	6	4,772	406	4,772	4,772		
10 pair.....					320	3,200	5	3,200	320	3,200	3,200		
8 pair.....					2,233	17,864	4	17,864	2,233	17,864	17,864		
5 pair.....					282	1,692	2	1,128	282	1,692	1,128		
3 pair.....					705	2,820	1	1,410	705	2,820	1,410	2,820	
Total.....					4,081	33,048	.....	33,774	4,081	33,048	33,774	

IN SERVICE JUNE 30, 1916.

150 pair	2,382,300	7,941	2,162,400	2,382,300	480	30	28,800	60	57,600	7,941	28,800	2,162,400	2,382,300
100 pair	462,000	10,812	2,162,400	462,000	4,503	30	270,180	50	450,300	10,812	270,180	2,162,400	462,000
90 pair													
80 pair													
75 pair													
70 pair													
60 pair													
55 pair													
50 pair													
45 pair													
40 pair													
35 pair													
33 pair													
30 pair													
25 pair													
20 pair													
18 pair													
15 pair													
14 pair													
12 pair													
10 pair													
6 pair													
5 pair													
3 pair													
Total	47,899	58,261	4,489,760	3,055,700	638,043	.....	8,665,836	.....	12,052,416	744,203	10,589,906	16,545,176	3,055,700

Installed 4.8 miles of cable containing 103,392 miles of conductor; withdrawn, 0.773 mile of cable containing 12,656 miles of conductor; in service June 30, 1916, 140 miles of cable containing 5,717,951 miles of conductor.

152 OPERATIONS OF THE ENGINEER DEPARTMENT, D. C.

Amount of space occupied by cable installed and withdrawn during year and that in service July 1, 1916.

Owner of space.	Space occupied by cable.		
	Installed during year.	Withdrawn during year.	July 1, 1916.
District of Columbia.....	11,603	1,355	172,501
Chesapeake & Potomac Telephone Co.....	12,655	2,500	528,077
Washington Railway & Electric Co.....			27,590
United States Government.....			1,536
Western Union Telegraph Co.....			7,180
Washington Terminal Co.....			1,019
Submarine cable.....			150
Placed in parking.....	802		2,917
Miscellaneous.....	302	226	3,233
Total.....	25,362	4,081	744,203

¹ Under this name are included the conduits of all companies controlled by this corporation.

Aerial cable withdrawn during the year and the amount in service June 30, 1916.

WITHDRAWN.

Size of cable.	Telephone.		Combination.						Total.		
	Cable.	Conduc- tors, No. 19 (Brown & Sharpe).	Cable.	Conductors (Brown & Sharpe).				Cable.	Conductors (Browne & Sharpe).		
				No. 14.		No. 19.			No. 14.	No. 19.	
				Pair.	Conduc- tors.	Pair.	Conduc- tors.				
Feet.	Feet.	Feet.	No.	Feet.	No.	Feet.	Feet.	Feet.			
25 pair.....	Feet.	Feet.	Feet, 2,772	No. 10	Feet. 55,440	No. 15	Feet. 83,160	Feet, 2,772	Feet. 55,440	Feet. 83,160	

IN SERVICE JUNE 30, 1916.

25 pair.....	1,599	79,950	7,358	10	147,160	15	220,740	8,957	147,160	300,690
15 pair.....			8,625	6	103,500	9	155,250	8,625	103,500	155,250
12 pair.....			9,558	6	114,696	6	114,696	9,558	114,696	114,696
8 pair.....			852	4	6,816	4	6,816	852	6,816	6,816
Total.....	1,599	79,950	26,393		372,172		497,502	27,992	372,172	577,452

In service June 30, 1916, 5.3 miles of cable containing 179.85 miles of conductor.

TELEPHONE SYSTEM.

The following 22 telephones were added to the two switchboards of the department during the year:

District Building:	
Offices of the auditor, extension telephones.....	2
Offices of the plumbing inspector, room 116.....	1
Offices of the Board of Children's Guardians, room 337, extension.....	1
Offices of the automobile board, room 119.....	1
Offices of the health officer, room 207.....	1
Offices of the chief engineer, fire department, room 3.....	1

Outside offices:

Leper hospital, in watchman's quarters.....	1
Third police precinct garage.....	1
Rosedale playgrounds.....	1
Howard playgrounds.....	1
Thirty-fourth street and Volta Place playgrounds.....	1
Fire department repair shop.....	1

Public schools:

Miner Normal School.....	2
Mott School.....	1
Garnet School.....	1
Ludlow School.....	1
Jefferson School.....	1
Curtis School, extension.....	1
Wisconsin Avenue Manual Training School, extension.....	1
Business High School, extension.....	1

The following nine telephones on these switchboards were discontinued during the year:

District Building:

Offices of the Public Utilities Commission, room 17.....	1
Offices of the Public Utilities Commission, photostat room.....	1
Offices of superintendent of sewers, room 305, extension.....	1

Outside offices: Old Emergency Hospital Building, one extension..... 2

Public schools:

Storerooms, 1500 Eckington Place.....	3
O Street Vocational School.....	1

Franklin School switchboard: Three telephones for use of the public schools storerooms, 1600 Eckington Place, were added to this switchboard during the year; one telephone, Franklin School Building, on this switchboard was discontinued during the year.

Police Department switchboard: Two telephones, rooms 217 and 217-A, District Building, were added to this switchboard during the year.

Water department switchboard: One telephone, repair shop, Bryant Street pump-ing station, was added to this switchboard during the year.

Number of telephones connected to the District system July 1, 1916.

Offices in the District Building.....	162
Outside offices and institutions.....	82
Public schools.....	201
Fire department.....	52
Police department, private branch exchange.....	50
Franklin School, private branch exchange.....	28
Water department, private branch exchange.....	42
Western High School, private branch exchange.....	17
McKinley Manual Training School, private branch exchange.....	15
James Ormond Wilson Normal School, private branch exchange.....	29
Miner Normal School, private branch exchange.....	14
Washington Asylum and Jail, private branch exchange.....	17
Police patrol service.....	434
Total.....	1,143

There are 26 portable telephone sets in service, the property of the District of Columbia. These instruments are used by the fire department and the employees of the electrical department.

STORAGE-BATTERY SYSTEM.

The number of cells of storage battery in service July 1, 1916, was as follows:

On fire-alarm circuits.....	1,862
On patrol circuits.....	226
On local circuits.....	86
Total.....	2,174

DISTRICT UNDERGROUND CONDUIT AND CABLE SYSTEM.

The following conduit connections were made to the underground system:

Fire-alarm posts (total, 23).

Nichols Avenue and Howard Road SE.	Sixth and I Streets SW.
Thirteenth and K Streets SE.	Seventh and K Streets SW.
Connecticut Avenue and Tilden Street NW.	Seventh and I Streets SW.
Nichols Avenue at intersection of Maple View Avenue and Pleasant Street SE.	Sixteenth and E Streets SE.
Water and F Streets SW.	Nineteenth Street and Potomac Avenue SE.
First and N Streets SW.	F Street between Fifteenth Street and Tennessee Avenue NE.
South Capitol and O Streets.	Twenty-seventh and Garfield Streets NW.
New Jersey Avenue and M Street SE.	Connecticut Avenue and L Streets NW.
Seventeenth and East Capitol Streets NE.	Madison Street and Colorado Avenue NW.
Thirteenth and I Streets NE.	Ninth and Longfellow Streets NW.
Fifth Street and Seward Square SE.	Eighth and Jefferson Streets NW.
Florida Avenue and Eckington Place NE.	

Police patrol posts (total, 19).

Thirteenth and L Streets SE.	Seventeenth and Kramer Streets NE.
Fourteenth and K Streets SE.	Twelfth and I Streets SE.
Fourteenth and Kennedy Streets NW.	Eleventh and G Streets NE.
Half and O Streets SE.	Fifth and Shepherd Streets NW.
South Capitol and O Streets.	Sixth and K Streets SW.
First and N Streets SW.	Potomac Avenue and E Street SE.
Seventeenth and A Streets SE.	Fourteenth and F Streets NE.
Fifth Street between Pennsylvania Avenue and Seward Square SE.	South Capitol and B Streets SE.
Twelfth and E Streets NE.	Eighth and Kennedy Streets NW.
	Sixteenth and Longfellow Streets NW.

Connections to buildings (total, 15).

Naval Hospital, Twenty-fourth and E Streets NW.	Howard Playgrounds, Fourth and W Streets NW.
Hygienic Laboratory, Twenty-fifth and E Streets NW.	Rosedale Playgrounds, Seventeenth and Gales Streets NE.
Review & Herald Publishing Co., Carroll and Willow Streets NW.	Playgrounds, Thirty-fourth Street and Volta Place NW.
Lemon Building, 1729 New York Avenue NW.	Willard Building, 515 Fourteenth Street NW.
Emergency Hospital, New York Avenue between Seventeenth and Eighteenth Streets NW.	Ambush School, L Street between Sixth and Seventh Streets SW.
Convention Hall, Fifth and L Streets NW.	Webb School, Fifteenth and Rosedale Streets NE.
Syphax School, Half Street between N and O Streets SW.	No. 28 Engine House, fire department, Connecticut Avenue between Ordway and Porter Streets NW.
Jackson School, R Street between Thirtieth and Thirty-first Streets NW.	

Connections between conduits (total, 4).

Twenty-ninth and Tilden Streets NW.	Thirty-first and R Streets NW.
K Street between Half and South Capitol Streets SE.	Eleventh and I Streets SE.

Conduit extensions (total, 11).

Seventh and Q Streets NW.	Tenth Street between B Street and Louisiana Avenue NW.
Seventh and R Streets NW.	Blair Road and Fourth Street NW.
Seventh Street and Florida Avenue NW.	Thirtieth and K Streets NW.
Seventh and L Streets NW.	Twenty-second and N Streets NW.
Seventh and M Streets NW.	Sixth and M Streets SW.
Tenth and C Streets NW.	

In making the above-mentioned connections and extensions, 20,549 feet of conduit (duct feet) and 34 manholes were built, the work being done by this department.

Connections to the underground system, July 1, 1916.

Fire-alarm posts.....	1407
Police-patrol posts.....	320
Cable-terminal posts.....	7
Schoolhouses.....	72
Fire-department houses.....	31
Police station houses.....	13
Miscellaneous District buildings.....	13
United States Government buildings.....	25
Private buildings.....	58
Cable poles.....	71
Total.....	1,017

POLICE-PATROL SYSTEM.

The following changes and — new installations were made in the patrol system:

Fourth precinct.—Change from overhead to underground connection: Box No. 23, First and N Streets SW.; box No. 36, South Capitol and O Streets SW.

Fifth precinct.—New installation, connected underground: Box No. 40, South Capitol and B Streets SE.; box No. 46, Fifth Street between North Carolina Avenue and Seward Square SE. Changed from overhead to underground connection: Box No. 17, Half and O Streets SE.; box No. 21, Fourteenth and K Streets SE.; box No. 26, First and L Streets SE.; box No. 39, Thirteenth and L Streets SE.; box No. 53, Seventeenth and A Streets SE.

Seventh precinct.—The system was changed in this precinct from a two-circuit registering and bridging system to a straight telephone service, each box connected direct to the precinct station by an independent circuit. Box No. 54, Conduit and Foxhall Roads, was transferred to the subprecinct, Tenleytown.

Ninth precinct.—New installation, connected underground: Box No. 55, Seventeenth and Kramer Streets NE.; box No. 61, Twelfth and E Streets NE.; box No. 62, Eleventh and G Streets NE.

Tenth precinct.—New installation, connected underground: Box No. 127, Fourteenth and Kennedy Streets NW.; box No. 128, Sixteenth and Longfellow Streets NW.; box No. 152, Fifth and Shepherd Streets NW.

Eleventh precinct.—New installation, connected overhead: Box No. 56, Giesboro Road and District line SE.

Subprecinct, Tenleytown.—Box No. 124, Little Falls and Conduit Roads NW., and box No. 131 Nebraska Avenue and Ridge Road NW., were changed from booth to wall boxes. Box No. 54, Conduit and Foxhall Roads, was transferred to this precinct from the seventh precinct.

On July 1, 1916, the distribution of boxes among the precincts was as follows:

Precinct.	Wall boxes.		Booths.	Total.
	Under-ground.	Over-head.		
First.....	31	1		32
Second.....	26			26
Third.....	46			46
Fourth.....	34	3		37
Fifth.....	36	5		41
Sixth.....	26			26
Seventh.....	22	3		25
Eighth.....	25			25
Ninth.....	29	21		50
Tenth.....	42	15	1	58
Eleventh.....		35	1	36
Subprecinct, Tenleytown.....	9	17	1	27
Total.....	2 326	100	3	429

¹ One of these posts carries a private fire alarm box.

² Six of these boxes, at following locations, are not on posts: 3, Union Station; 1, Engineer stables, First and Canal Streets; 1, Takoma Park, watchbox; 1, Treasury Department.

FIRE-ALARM SYSTEM.

Fourteen new fire-alarm boxes were placed in service during the year—11 public and 3 private—located as follows:

Public boxes.

No. 357, Connecticut Avenue and L Street NW.
 No. 463, Seventh and H Streets SW.
 No. 535, Fifth Street and Seward Square SE.
 No. 567, New Jersey Avenue and M Street SE.
 No. 756, Twenty-seventh and Garfield Streets NW.
 No. 931, Stanton and Pomeroy Roads SE.
 No. 958, Alabama Avenue and Stanton Road SE.
 No. 989, Forty-eighth Street and Sheriff Road NE.
 No. 6117, Thirteenth and I Streets NE.
 No. 8124, Sixteenth and Longfellow Streets NW.
 No. 8156, Blair and Riggs Road NE.

Private boxes.

No. 498, Agricultural Department.
 No. 1239, Willard Building, 515 Fourteenth Street NW.
 No. 8165, Review & Herald Publishing Association Building, Takoma Park, D. C.

Two private boxes were discontinued during the year, located as follows:

No. 344, St. John's Orphanage, Twentieth and F Streets NW.
 No. 358, Department Quartermaster's office, 532 Seventeenth Street NW.

During the year 14 fire-alarm boxes were changed from overhead to underground connection.

Fire-alarm boxes in service.

	July 1, 1915.	July 1, 1916.
Connected by overhead wires:		
Public boxes.....	80	75
Private boxes.....	28	21
Connected by underground wires:		
Public boxes.....	381	397
Private boxes.....	92	100
Total.....	581	593

† Nine additional boxes connected to underground system, but not yet in service.

Alarms received by the month.

Month.	Box.		Local.	
	Number.	False.	Number.	False.
1915.				
July.....	41	7	26	.....
August.....	39	8	24	1
September.....	44	4	28	.....
October.....	45	5	45	.....
November.....	71	10	78	3
December.....	93	20	65	.....
1916.				
January.....	81	14	61	1
February.....	69	15	49	.....
March.....	64	10	93	3
April.....	77	7	67	2
May.....	67	8	44	1
June.....	43	7	26	4
Total.....	734	115	606	15

Alarms received and transmitted:

Regular box alarms.....	727
Alarms from telephone stations.....	7
Alarms from National Automatic boxes.....	0
Local alarms.....	606
Second alarms.....	18
Third alarms.....	3
Fourth alarms.....	1
Total.....	1,362
False box alarms.....	115
False local alarms.....	15

Each fire-alarm box was tested several times during the year, the contact points cleaned, and the mechanism thoroughly overhauled. This is done regularly once a month as far as possible. The total number of tests amounted to 5,277, being an average of 8.915 per box.

POLES.

Under the authority of the act of Congress approved June 30, 1902, regulating the use of telephone wires in the District of Columbia, the Chesapeake & Potomac Telephone Co. has reported the following amount of work done during the fiscal year: Poles erected in streets within the prescribed area:

Line.....	1
Poles erected in alleys within the prescribed area:	
Line.....	26
Guy.....	3
Anchors.....	11
	40
Poles erected in streets outside the prescribed area:	
Line.....	146
Guy.....	13
Anchors.....	41
	200
Poles erected in alleys outside the prescribed area:	
Line.....	115
Guy.....	16
Anchor.....	32
	163
Total.....	404
Poles taken down in streets within the prescribed area:	
Line.....	1
Poles taken down in alleys within the prescribed area:	
Line.....	29
Guy.....	12
Anchor.....	4
	45
Poles taken down in streets outside the prescribed area:	
Line.....	83
Guy.....	15
Anchors.....	3
	101
Poles taken down in alleys outside the prescribed area:	
Line.....	22
Guy.....	4
Anchors.....	3
	29
Total.....	176
Total erected during the year.....	404
Total taken down during the year.....	176
Net increase.....	228

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Guy.....	16
Anchor.....	32
	163
Total.....	404
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Poles taken down in alleys within the prescribed area:	
Line.....	29
Guy.....	12
Anchor.....	4
	45
Poles taken down in streets outside the prescribed area:	
Line.....	83
Guy.....	15
Anchors.....	3
	101
Poles taken down in alleys outside the prescribed area:	
Line.....	22
Guy.....	4
Anchors.....	3
	29
Total.....	176
Total erected during the year.....	404
Total taken down during the year.....	176
Net increase.....	228

Miscellaneous pole work—Poles erected, taken down, moved, etc.

	Erected.			Taken down.			Moved.		Replaced.		Reset.		Increase.		Decrease.	
	Line.	Guy.	Anchor.	Line.	Guy.	Anchor.	Line.	Guy.	Line.	Guy.	Line.	Guy.	Line.	Guy.	Line.	Guy.
Chesapeake & Potomac Telephone Co.	287	32	84	134	31	10	46	2	171	11	30	1	153	1		
Potomac Electric Power Co.	380	35	152	38	11	4	67		113	1	16		342	24		
Western Union Telegraph Co.					5				7		2				5	
District of Columbia				55	1										55	1
Baltimore & Washington Transit Co.					7											
Capital Traction Co.	2			1					6				1			
Columbia Railway Co.									2							
Washington & Maryland Co.									1							
City & Suburban Railway Co.	1			1												
Washington Interurban Railway Co.									1							
Postal Telegraph Cable Co.									2							
East Washington Heights Traction Co.				1											1	
Total	670	67	236	235	43	21	113	2	303	12	48	1	496	25	61	1

List of poles of all kinds, July 1, 1916.

	Line.	Guy.	Total.
District of Columbia	468	14	482
United States Government	297	1	298
Chesapeake & Potomac Telephone Co.	6,178	643	6,821
Potomac Electric Power Co.	5,996	194	6,190
Western Union Telegraph Co.	999		999
Postal Telegraph Cable Co.	356	9	365
Brightwood Ry. Co.	340		340
Columbia Ry. Co.	461	4	465
Anacostia & Potomac Ry. Co.	3		3
City & Suburban Ry. Co.	86		86
Georgetown & Tenleytown Ry. Co.	304		304
Capital Railway Co.	208		208
Washington & Baltimore Transit Co.	30		30
Maryland & Washington Ry. Co.	158		158
Capital Traction Co.	204		204
Washington & Glen Echo Ry. Co.	8		8
Steam railroads	545		545
Washington & Great Falls R. R. Co.	401	1	402
Washington Interurban R. R. Co.	185	4	189
East Washington Heights Traction R. R. Co.	65		65
Total	17,202	870	18,072

ELECTRIC-WIRING INSPECTION.

The following tables show the amount of work performed by this department in connection with the electrical wiring inspection:

Permits issued by the inspector of buildings authorizing electrical wiring:	
Buildings	1,258
Machinery	164
Signs	54
	1,476

Permits issued by the electrical department:

For inside-electrical work.....	3, 160
For outside electrical work.....	140
Temporary permits—	
Electric wiring.....	33
Use of current.....	233
Without fee (ordered by District of Columbia, etc.).....	132
Building permits.....	1, 582
Quarterly.....	56
Gas lamps outside.....	112
	<hr/>
	5, 448
	<hr/>

Certificates issued:

Final.....	3, 408
Without fee.....	53
Preliminary.....	7
	<hr/>
	3, 468
	<hr/>

Lamps and apparatus installed:

Incandescent.....	78, 591
Arc lamps.....	72
Miscellaneous.....	4, 250
Blank outlets.....	457
Motors.....	665
Total horsepower of motors.....	2, 925. 625
Generators.....	14
Total kilowatt capacity of generators.....	109. 75
Defective wiring reported by inspectors.....	296
Notices of defective wiring sent.....	1, 465
Requests for inspection.....	18
Miscellaneous.....	6
Cooking ranges, etc.....	10
Inspection in connection with yearly license.....	135
	<hr/>

Fees paid to the collector of taxes:

For permits.....	\$5, 948. 00
For certificates.....	60. 00
For 157 copies Rules and Regulations, at 30 cents each.....	47. 10
	<hr/>
	6, 055. 10

Work of inspectors of electric wiring from July 1, 1915, to June 30, 1916.

Inspections in private buildings.....	11, 980
Inspections in municipal buildings.....	953
Inspections in theaters.....	2, 011
	<hr/>
Total inspections.....	14, 944

MISCELLANEOUS WORK.

This department prepared plans and specifications for and supervised the introduction of electric installation in the following municipal properties:

Completed work.

Fire department:

- No. 3 truck house, extension of electric lighting system.
- No. 5 truck house, alterations and repairs to electric lighting system.
- No. 7 truck house, alterations and extensions to electric lighting system.
- No. 5 engine house, repairs to electric lighting system.
- No. 6 engine house, repairs to electric lighting system.
- Repair shops, battery-charging system.
- No. 9 engine house, alterations to electric lighting system.
- No. 10 engine house, repairs to electric lighting system.

Fire department—Continued.

- No. 16 engine house, extensions and repairs to lighting system.
- No. 12 engine house, electric lighting system.
- No. 21 engine house, extensions and repairs to electric lighting system.
- No. 27 engine house, alterations to electric lighting system.

Board of Education:

- Western High School, clock and bell system.
- Western High School, electric lighting system.
- J. O. Wilson School, assembly hall exit lights.
- J. O. Wilson School, stage equipment—dimmers.
- M Street High School, central heating plant, repairs to electric lighting system.
- Grover Cleveland School, assembly hall, exit lights.
- Smallwood School, electric-power system.
- S. J. Thomson School, alterations and extensions to electric lighting system.
- Armstrong Manual Training School, repairs to generator equipment.

Police department:

- Tennallytown substation, alterations to electric lighting system.
- Harbor precinct station, electric wiring for launch.

Miscellaneous:

- Washington Asylum Laboratories, electric lighting system and X-ray machine wiring.
- Tuberculosis Hospital, superintendent's residence, electric lighting system.
- Western Market, repairs to electric lighting system.
- Leper house, electric lighting system.
- Surface division blacksmith shop, electric lighting system.
- Surface division blacksmith shop, drill-press motor.
- Pennsylvania Avenue Rock Creek Bridge (interior), electric lighting system.
- Engineer department storerooms, electric lighting system.

Work in progress.

Fire department:

- No. 1 truck house, electric lighting system.
- No. 6 truck house, electric lighting system.
- No. 28 engine house, electric lighting system.

Board of Education:

- Park View School, complete electric wiring system.
- New Central High School, electric lighting and power system; supervision, inspection, and tests only.
- New Central High School, stage equipment; border light fixtures.
- New Central High School, motion-picture machine and wiring.
- Jefferson School, stereopticon outlet.
- Armstrong Manual Training School, repairs to motor.
- Franklin School, alterations to fixture equipment.
- C. F. Powell School addition, electric-lighting system.
- Dunbar High School, electric lighting system.
- Dunbar High School, motion-picture machine and equipment.
- Dunbar High School, alterations to power panel.
- Dunbar High School, laboratory equipment.
- Dunbar High School, wiring for dish-washing machine and electric oven.

Police department:

- No. 4 station, repairs to electric-lighting system.
- No. 9 station, electric lighting system.

Specifications prepared—work not started.

- Old Central High School, extension of electric lighting system.
- Brookland School, stereopticon outlet.
- Miner Normal School, extension to electric lighting system.
- Miner Normal School, motion-picture machine and equipment.
- Western High School, laboratory generator.
- Western High School, extensions to electric-lighting system.
- Franklin School, electric heater.
- J. O. Wilson School, electric wiring for dish-washing machine.
- Water department garage, electric lighting and power system.
- Workhouse wharf, electric lighting system.

No. 5 truck, District of Columbia Fire Department, extension of electric lighting system.

Public convenience station No. 4, electric-lighting system.

District Building, health office, repairs to electric oven.

Minor repairs were made by inspector to the electric wiring or apparatus in the following buildings: No. 5 truck house, No. 6 truck house, No. 7 engine house, No. 9 engine house, No. 10 engine house, No. 16 engine house, No. 8 police station, Wisconsin Avenue Manual Training School, S. J. Thomson School, Western High School, Armstrong Manual Training School, engineer department stables, electrical department garage, Home for the Aged and Infirm, crematorium, smallpox hospital, smallpox quarantine station, public convenience station No. 1, public convenience station No. 2.

GENERAL SUPPLIES.

Receipts.

Appropriation.....	\$11, 050. 00
Repayments.....	83. 26
Total.....	11, 133. 26

Expenditures.

Office expenses.....	\$846. 42
Telephone rental, etc.....	3, 898. 11
Instruments and apparatus.....	905. 88
Cable.....	1, 746. 14
Labor pay roll.....	1, 148. 44
Storeroom expenses.....	360. 04
Wire.....	460. 51
Line supplies.....	207. 25
Tools and hardware.....	68. 35
Batteries and battery supplies.....	228. 58
Repairs to pavements.....	5. 70
Maintenance of engineer department stables.....	109. 88
Paints.....	1. 25
Car tickets.....	80. 00
Gas and electric current.....	31. 44
Cartage, freight, and expressage.....	10. 05
Conduit supplies.....	102. 40
Stable expenses.....	488. 59
Telegraph messages.....	1. 31
Ice.....	5. 22
Miscellaneous.....	20. 75
Total.....	10, 726. 31

LIGHTING.

Receipts.

Appropriation.....	\$395, 000. 00
Repayments by Baltimore & Ohio R. R. Co.....	337. 99
Repayments by Georgetown Barge, Dock, Elevator & R. R. Co.....	520. 91
Repayments by Washington Terminal Co.....	¹ 3, 797. 41
Repayments by Philadelphia, Baltimore & Washington R. R. Co.....	¹ 5, 669. 13
Repayments, miscellaneous.....	91. 95
Total.....	405, 417. 39

¹ Due, but not paid.

Expenditures.

Mantle gas lighting:		
Washington Gas Light Co.....	\$165, 675. 21	
Deductions for defective service.....	19. 51	
		\$165, 655. 70
Georgetown Gas Light Co.....	10, 410. 68	
Deductions for defective service.....	12. 39	
		10, 397. 79
Incandescent electric lighting:		
Potomac Electric Power Co.....	133, 589. 37	
Deductions for defective service.....	546. 87	
		133, 042. 50
Electric arc lighting:		
Potomac Electric Power Co.....	68, 927. 77	
Deductions for defective service.....	809. 66	
Deductions for Pennsylvania Avenue lights extinguished after 1 a. m.....	1, 204. 27	
		66, 913. 84
Street designation lighting:		
Washington Gas Light Co.....	3, 594. 69	
Deductions for defective service.....	. 31	
		3, 594. 38
Georgetown Gas Light Co.....	249. 97	
Deductions for defective service.....	. 09	
		249. 88
Potomac Electric Power Co.....	845. 16	
Deductions for defective service.....	. 64	
		844. 52
Lamp-posts, globes, etc.....		3, 099. 20
Street signs, etc.....		1, 440. 63
Erecting, moving, and taking down lamp-posts.....		716. 80
Paints, oils, etc.....		94. 68
Office and traveling expenses.....		110. 66
Repairs to pavements.....		89. 28
Freight, expressage, and cartage.....		21. 07
Stable expenses.....		103. 75
Maintenance of engineer department stables.....		142. 50
Rent of storeroom.....		780. 00
Tools and hardware.....		32. 15
Car tickets.....		70. 00
Storeroom expenses.....		35. 90
Ground-glass shades and holders.....		50. 96
Telegraph and telephone messages.....		. 55
Tree trimming.....		497. 15
Electric current and gas.....		4. 80
Labor pay roll.....		4, 718. 13
		392, 706. 82

WIRES UNDERGROUND.

Receipts.

Appropriation.....	\$7, 000. 00
Repayments.....	1, 057. 34
Total.....	8, 057. 34

Expenditures.

Labor pay roll.....	\$2, 467. 45
Cable.....	1, 989. 80
Conduit supplies.....	1, 295. 34
Repairs to pavements.....	729. 98
Posts for fire-alarm and police boxes.....	691. 85
Tools and hardware.....	151. 82
Wire.....	128. 09
Conduit construction.....	35. 54
Cartage.....	16. 50
Total.....	7, 506. 37

EXTENSION OF POLICE PATROL.

Receipts.

Appropriation.....	\$1,200.00
Repayments.....	7.71

1,207.71

Expenditures.

Cable.....	\$387.72
Conduit supplies.....	184.50
Posts for police patrol boxes.....	151.55
Repairs to pavements.....	119.74
Labor pay roll.....	67.13
Apparatus.....	48.00
Tools and hardware.....	29.26
Cartage.....	8.25

Total..... 996.15

FIRE-ALARM BOXES.

Receipts.

Appropriation.....	\$2,000.00
Repayments.....	1.15

Total..... 2,001.15

Expenditures.

Fire-alarm boxes.....	\$750.00
Cable.....	432.00
Repairs to pavements.....	224.19
Posts for fire-alarm boxes.....	159.60
Conduit supplies.....	150.00
Labor pay roll.....	109.25
Tools and hardware.....	20.70
Cartage.....	8.25

Total..... 1,853.99

REPORT OF THE CHIEF CLERK OF THE ENGINEER DEPARTMENT.

WASHINGTON, D. C., October 2, 1916.

SIR: I have the honor to submit the following report of the operations of this office for the fiscal year ended June 30, 1916:

Communications received, briefed, recorded, and indexed.....	12,426
Vouchers prepared and recorded.....	472
Contracts drawn and indexed.....	241
Bonds approved and indexed.....	337

The tables accompanying this report show statement of contracts entered into during the year.

Very respectfully,

DANIEL E. GARGES,
Chief Clerk, Engineer Department.

Lieut. Col. C. W. KUTZ,
Corps of Engineers, United States Army,
Engineer Commissioner, District of Columbia.

STATEMENT OF CONTRACTS.

Contracts entered into by the District of Columbia during the fiscal year 1916.

1. HIGHWAY IMPROVEMENTS.

No.	Name of contractor.	Nature of contract.
5885	Edward G. Gummel.....	Grading and improving streets and avenues.
5886	G. B. Mullin.....	Do.
5900	Warren F. Brenizer Co.....	Laying cement sidewalks.
5926	Cranford Paving Co.....	Paving approaches to Q Street Bridge.
5930	G. B. Mullin Co.....	Grading Division Avenue and Albemarle Street.
5935	Washington Asphalt Block & Tile Co.	Laying asphalt block pavement on Twelfth and Fourteenth Streets SE.
6049	Louis M. Johnston.....	Constructing culvert at Everts Street NE., between Twenty-fourth and Twenty-sixth Streets.
6052	George Hyman.....	Grading Naylor Road SE.

2. SEWER CONSTRUCTION.

5825	William F. Cush.....	Northampton Street outlet sewer.
5839	George Hyman.....	Northampton, McKinley, Morrison, and Thirty-second Streets.
5925	do.....	Anacostia main interceptor, section 5.
5931	Warren F. Brenizer Co.....	Hillbrook service sewers.
5939	Louis M. Johnston.....	Thirty-second Street, between Northampton and Rittenhouse Streets.
5940	do.....	Nichols Avenue SE., between Howard Road and Talbert Street.
5941	do.....	Fourth Street, Takoma Park.
5942	do.....	Third Street NE., between E and F Streets.
5943	Dabbs & Myers.....	Van Buren, Sixth and Underwood Streets.
5944	do.....	Taylor Street and Rock Creek Church Road.
5947	Warren F. Brenizer Co.....	Eighteenth Street NW., N to P Streets.
5948	do.....	Connecticut Avenue and Van Ness Street.
5949	George Hyman.....	Benning Road, between Thirty-fourth Street and Anacostia Road.
5955	Charles H. Tompkins.....	Alley, Square 3238, and in Illinois Avenue.
5956	Harper & Voigt Co.....	Kenilworth service sewers, section 2.
5957	Warren F. Brenizer Co.....	Tilden Street, Rock Creek to Connecticut Avenue.
5958	do.....	Reno Road, Rodman and Thirty-fifth Streets.
5968	Louis M. Johnston.....	Webster Street and New Hampshire Avenue.
5978	Warren F. Brenizer Co.....	Fourteenth Street NW., H to K Streets.
5979	do.....	Pennsylvania Avenue NW., between Second and Third Streets.
5980	do.....	Old Tiber Creek, between Second and Third Streets.
5998	W. D. Murray & Co.....	Outlet sewers, Anacostia.
6026	Warren F. Brenizer Co.....	Seventeenth Street NW., D Street to New York Avenue.
6027	do.....	Anacostia main interceptor, section 6.
6048	do.....	Langdon.
6050	Louis M. Johnston.....	Kingle Ford trunk sewer.
6053	George Hyman.....	Kenilworth.
6054	do.....	Hillbrook.

3. MATERIAL AND HAULING.

5831	Morgantown Brick Co.....	Sewer invert brick.
5836	Standard Oil Co.....	Paving pitch.
5837	United States Asphalt Refining Co.....	Road oil.
5838	American Steel & Wire Co.....	Copper wire.
5841	Sun Co.....	Road oil.
5854	Barrett Manufacturing Co.....	Refined tar.
5855	Ward & Co.....	Copper wire.
5862	Mary S. Mann.....	Hauling books, etc., for schools.
5864	Richmond Granite Co.....	Curb.
5868	North Carolina Granite Co.....	Do.
5871	Queen City Brick & Tile Co.....	Paving block.
5872	Standard Oil Co.....	Fuel oil.
5877	United Gas Improvement Co.....	Road oil.
5886	Lynchburg Foundry Co.....	Cast-iron water pipe.
5887	do.....	Cast-iron water pipe specials.
5896	Fred J. White.....	Miscellaneous castings.
5912	Richmond Granite Co.....	Curb.
5913	American Sewer Pipe Co.....	Terra-cotta sewer pipe.
5922	Headley Good Roads Co.....	Road-patching material.
5923	William T. Galliher & Bro. (Inc.).....	Bridge lumber.
5961	H. Mueller Manufacturing Co.....	Lead flange couplings.
5962	Cuyler & Mohler.....	Brass curb cocks.
5963	Nassau Smelting & Refining Works.....	Pig lead.

Contracts entered into by the District of Columbia during the fiscal year 1916—Contd.

3. MATERIAL AND HAULING—Continued.

No.	Name of contractor.	Nature of contract.
5962	Napoleon S. Violett.....	Bridge lumber.
5975	Barber & Ross.....	Reinforcing steel.
5976	L. A. Clarke & Son.....	Bridge lumber.
5977	William T. Galliher.....	Do.
5987	Washington Asphalt Block & Tile Co.....	Asphalt paving block.
6009	Glamorgan Pipe & Foundry Co.....	Water pipe and water pipe specials.
6012	Standard Lime & Stone Co.....	Quarrying stone near Dickerson, Md.
6013	.....do.....	Limestone and limestone dust.
6016	Lewis Hopfenmaier.....	Pig lead.
6020	National Mortar Co.....	Portland cement.
6045	Smoot Sand & Gravel Co.....	Sand and gravel.

4. BUILDING AND BUILDING REPAIRS.

5821	P. F. Gormley Co.....	Superstructure, Dunbar High School No. 174.
5847	Riggs, Distler & Stringer.....	Heating and ventilating, Dunbar High School No. 174.
5852	Standard Engineering Co.....	Electrical work, Dunbar High School No. 174.
5853	.....do.....	Plumbing work, Dunbar High School No. 174.
5860	Heine Chimney Co.....	Brick stack, Dunbar High School No. 174.
5882	Samuel A. Gregory.....	Repairing furnaces in schools.
5897	The Biggs Heating Co.....	Boilers, Stephens and Garnet Schools.
5898	.....do.....	Boiler, Industrial Home School.
5899	Reading Chandelier Works.....	Lighting fixtures, Western High School.
5906	The Biggs Heating Co.....	Boiler, Emery School.
5914	Isadore Freund.....	Plumbing work, Park View School No. 175.
5916	Riggs, Distler & Stringer.....	Heating and ventilating, Park View School No. 175.
5917	Standard Engineering Co.....	Electrical work, Park View School No. 175.
5928	Henry B. Davis.....	Mill and carpenter work, Western High School.
5933	Charles White, Jr.....	Fireproof stairways, Ketcham School.
5950	James L. Marshall.....	Engine House No. 28, constructing.
5951	Skinker & Garrett.....	House for truck company No. 3 and engine company No. 1.
5952	Robert H. Sanford.....	Remodeling convenience station No. 1.
5967	G. B. Mullin Co.....	Grading Central High School grounds.
5971	Herman E. Burgess.....	Addition to Powell School No. 157.
5972	G. B. Mullin Co.....	Soiling, sodding, etc., grounds of Central High School.
5973	Detroit Plumbing Co.....	Plumbing work, Engine House No. 28.
6000	The Biggs Heating Co.....	Heating and ventilating, Powell School No. 157.
6002	Carroll Electric Co.....	Electric wiring, Powell School No. 157.
6008	Standard Electric Time Co.....	Clock and bell system, Western High School.
6014	Federal Heating Co.....	Heating plants, truck houses Nos. 2, 3, and 4, and engine house No. 11.
6046	The Biggs Heating Co.....	Boiler, Wallach School.
6051	Carroll Electric Co.....	Boilers, water department pumping station.

5. GENERAL SUPPLIES.

5819	Martin Wiegand.....	Furniture and lumber.
5822	Eagle Pencil Co.....	Stationery.
5824	Joseph Dixon Crucible Co.....	Do.
5826	Thomas Somerville Co.....	Plumbing material, oils, etc.
5828	Merchants Bag & Cover Co.....	Hardware.
5829	W. M. Galt & Co.....	Forage.
5830	W. S. Hoge & Bro.....	Do.
5832	C. F. Wilkins, Son & Co.....	Do.
5833	Z. D. Gilman.....	Drugs and saddlery.
5834	Charles G. Stott & Co.....	Stationery.
5840	B. F. Bond Paper Co.....	Do.
5842	Milton Bradley Co.....	Stationery, school books, etc.
5843	James F. Oyster.....	Groceries.
5844	Manhattan Coffee Mills (Inc.).....	Do.
5845	Washington Tobacco Co.....	Tobacco.
5846	R. Carter Ballantyne.....	Stationery, school books, etc.
5848	Mathers-Lamm Paper Co.....	Stationery.
5849	Fred A. Schmidt.....	Stationery, hardware, paints, etc.
5851	George F. Muth & Co.....	Do.
5856	Smith-Dixon Co.....	Stationery.
5857	R. P. Clarke Co.....	Drugs, stationery, and dry goods.
5858	James B. Lambie Co. (Inc.).....	Hardware, plumbing material, etc.
5859	Globe-Wernicke Co.....	Stationery and furniture.
5861	Hoover & Denham.....	Meats.
5863	Carroll Electric Co.....	Hardware and electrical supplies.
5865	William A. Simpson.....	Milk and cream.
5866	Louis Hartig.....	Hardware.
5867	Prang Co.....	Kidnergarten supplies, paints, etc.
5869	Corby Baking Co.....	Groceries.

Contracts entered into by the District of Columbia during the fiscal year 1916—Contd.

5. GENERAL SUPPLIES—Continued.

No.	Name of contractor.	Nature of contract.
5873	Dulin & Martin.....	House furnishings and hardware.
5874	Washington Rubber Co.....	Furniture, plumbing material, etc.
5875	J. W. Hunt & Co.....	Paints, hardware, etc.
5876	McDowell & Sons.....	Forage.
5878	B. F. Goodrich Co.....	Plumbing material and automobile supplies.
5879	Barber & Ross.....	Hardware, paints, and automobile supplies.
5880	Browning & Middleton.....	Groceries.
5884	Morris & Co.....	Groceries and drugs.
5885	C. D. Kenny Co.....	Groceries.
5888	Guy, Curran & Co.....	Shoes, drugs, and dry goods.
5889	National Electrical Supply Co.....	Electrical supplies, hardware, etc.
5890	Mackall Bros.....	Drugs.
5891	Chesley & Harvey.....	Automobile tire.
5892	Francis H. Leggett & Co.....	Groceries.
5893	United States Tire Co.....	Automobile tires.
5894	Cudahy Packing Co.....	Meats.
5895	Hugh Reilly Co.....	Paints.
5902	Swift & Co.....	Groceries.
5910	W. A. Smoot & Co.....	Fuel.
5936	C. F. Wilkins, Son & Co.....	Forage.
5937	Washburn-Crosby Co.....	Do.
5938	W. M. Galt & Co.....	Do.
5945	W. S. Hoge & Bro.....	Do.
6018	American Ice Co.....	Ice.
6019	J. B. Kendall Co.....	Hardware.
6021	W. B. Moses & Sons.....	Furniture.
6022	William H. Forester Co.....	Flags.
6023	C. M. Woolf & Co. (Inc.).....	Saddlery.
6024	Albert L. Johnson.....	Hardware.
6025	Harry Kaufman.....	Shoes and dry goods.
6028	Charles Scribner's Sons.....	School books.
6029	L. P. Steuart & Bro.....	Ice.
6030	Theo. Kromm & Sons.....	Saddlery.
6031	Swift & Co.....	Groceries.
6032	Manhattan Coffee Mills (Inc.).....	Do.
6033	Lansburgh & Bro.....	Furniture and dry goods.
6034	D. T. Buzby & Co.....	Groceries.
6035	A. G. Spalding & Bros.....	Athletic goods.
6036	Francis H. Leggett & Co.....	Groceries.
6037	Clark & Co.....	Tobacco.
6038	Browning & Middleton.....	Groceries.
6039	Cudahy Packing Co.....	Groceries and meats.
6040	Wm. T. Gallier & Bro.....	Lumber.
6041	W. A. H. Church (Inc.).....	Do.
6042	The Corby Baking Co.....	Bread and yeast.
6043	Peck & Hfills Furniture Co.....	Furniture.
6044	Hoover & Denham.....	Groceries and meats.

6. MISCELLANEOUS.

5820	Henry R. Worthington.....	Water meters.
5823	David Notes.....	Auctioneer services.
5827	L. G. Kelly Printing Co.....	Printing.
5870	White House Lunch Co.....	Coffee and sandwiches, police court.
5881	Campbell Electric Co.....	X-ray machine for Washington Asylum.
5883	Moorman Drayage Co.....	Removing refuse from markets.
5901	Central Foundry Co.....	Fire-alarm and patrol boxes.
5903	Boston Wood Finishing Co.....	Opera chairs, Western High School.
5904	The Dulaney-Vernay Co.....	Tables, desks, etc., Western High School.
5905	Harper-Overland Co.....	Four automobiles.
5907	Barber & Ross.....	Steel trusses for workhouse.
5908	Canton Art Metal Co.....	Steel cabinets, office of register of wills.
5909	Perry Scott.....	Horses for fire department.
5911	The Dulaney-Vernay Co.....	Laboratory equipment, Western High School.
5915	Western Electric Co.....	Underground cable.
5918	Edward Darby & Sons Co.....	Steel lockers, Western High School.
5919	Commercial Garage.....	Auto trucks for water department.
5920	Walker Electric Co.....	Switchboards, Western High School.
5921	Gramm-Berstein Co.....	Auto trucks for water department.
5924	A. G. Spalding & Bros.....	Playground equipment.
5927	A. P. Smith Manufacturing Co.....	Fire hydrants.
5929	Virginia School Supply Co.....	Playground equipment.
5932	The Seagrave Co.....	Installing tractors on fire engines.
5934	American-La France Fire Engine Co.....	Two combination hose and chemical wagons.
5946	Lippard-Stewart Motor Co.....	Auto trucks for water department.
5953	De Laval Steam Turbine Co.....	Steam turbine unit, water department, pumping station.
5954	Eureka Fire Hose Manufacturing Co.....	Hose for fire department.
5959	B. F. Sturtevant Co.....	Fuel economizer, water department, pumping station.

Contracts entered into by the District of Columbia during the fiscal year 1916—Contd.

6. MISCELLANEOUS—Continued.

No.	Name of contractor.	Nature of contract.
5960	L. G. Kelly Printing Co.....	Printing list of delinquents in payment of taxes.
5964	Combs Motor Co.....	Two automobiles.
5965	A. Rice Son & Co.....	Horses for fire department.
5966	Dover Fire Brick Co.....	Fire brick.
5970	American-La France Fire Engine Co..	New boiler for fire engine No. 20.
5974	Edgar H. Mosher.....	Concrete cover for Reno Reservoir.
5981	Fred Medart Manufacturing Co.....	Lockers, Central and Dunbar High Schools.
5982	The Dulaney-Vernay Co.....	Tables, etc., Central and Dunbar High Schools.
5983	W. B. Moses & Sons.....	Desks, etc., Central and Dunbar High Schools.
5984	do.....	Opera chairs, Central and Dunbar High Schools.
5985	John E. Sjostrom Co.....	Cabinetwork, Central and Dunbar High Schools.
5986	General Fireproofing Co.....	Metal book stacks, Central and Dunbar High Schools.
5988	Boston Wood Finishing Co.....	Equipment, Central and Dunbar High Schools.
5989	Arthur Bryant.....	Purchase of oyster shells.
5990	Federal Equipment Co.....	Cabinetwork, Central and Dunbar High Schools.
5991	do.....	Banking counter, Central and Dunbar High Schools.
5992	Fred Medart Manufacturing Co.....	Gymnasium equipment, Central and Dunbar High Schools.
5993	Globe-Wernicke Co.....	Desks, etc., Central and Dunbar High Schools.
5994	Wm. F. Dougherty & Sons.....	Kitchen equipment, Central and Dunbar High Schools.
5995	Barnhart Bros. & Spindler.....	Printing outfit, Central High School.
5996	Bramhall, Deane Co.....	Kitchen equipment, Washington Asylum.
5997	Kemp Machinery Co.....	Forge and machine shop equipment, Central and Dunbar High Schools.
5999	J. A. Fay & Egan Co.....	Woodworking machinery, Central High School.
6001	Charles A. Langley.....	Blackboards, etc., Central and Dunbar High Schools.
6003	Ornamental Foundry Co.....	Lamp-posts.
6004	Oliver Machinery Co.....	Woodworking machinery, Central High School.
6005	The Hall Organ Co.....	Organ for Dunbar High School.
6006	Charles E. Myers.....	Collecting and disposing of ashes from private residences, etc.
6007	do.....	Collecting and disposing of ashes and refuse from municipal buildings.
6010	Crown Metal Construction Co.....	Furniture, office of register of wills.
6011	E. F. Droop & Sons Co.....	Pianos for Central High Schools.
6015	West End Laundry.....	Laundry work.
6017	James B. Henderson.....	Stage and other curtains, Central High School.
6047	Heywood Bros. & Wakefield Co.....	Chairs for Park View School, No. 175.
6055	J. H. Weil & Co.....	Drawing tables, Western High School.
6056	Harper-Overland Co.....	Two motor patrol wagons.
6057	Edward M. Bemis.....	Expert services in connection with investigation of certain public-service corporations.
6058	Worthington Pump & Machinery Co.	Water meters.
6059	The Seagrave Co.....	Gasoline engine for fire department.

REPORT OF THE WHARF COMMITTEE.

WASHINGTON, October 10, 1916.

SIR: The wharf committee has the honor to submit the following report of its operations for the fiscal year ending June 30, 1916:

Accompanying is a list of wharf property now under lease on the Potomac River, the Anacostia River (or Eastern Branch), and James Creek Canal.

The rentals received from Potomac River wharves during the year amounted to \$17,278; from the Anacostia River, \$956.25; and from James Creek Canal, \$1,367.50, making the total amount received during the year \$19,601.75. This is a decrease from the rentals received during the preceding fiscal year of \$1,843.64. The reason for this decrease is that certain wharves which were formerly under lease have been assigned by the commissioners for municipal use.

AVAILABLE WATER FRONTAGE.

The actual water frontage in the District of Columbia, with the exception of canals devoted to commerce, is about 2 miles. The total available water frontage, exclusive of canals, which is practicable of commercial development is about 18 miles; this frontage, however, includes the portion set apart for parks and purposes of the United States, about 8 miles.

WHARVES ALONG THE WASHINGTON CHANNEL.

The largest amount of wharf property is that along the Washington Channel. This has a total frontage on the city side of 9.275 linear feet, of which 4.675 linear feet, between the grounds of the War College and the south curb line of N Street, is under

the jurisdiction of the Chief of Engineers, United States Army, and of the remaining 4,600 feet, between the south curb line of N Street south and Fourteenth Street SW., 4,021 feet is under the jurisdiction of the Commissioners of the District of Columbia, and 559 feet, between Thirteenth and Fourteenth Streets, is under the jurisdiction of the United States.

The leases for these wharves are generally for a period of five years, expiring March 15, 1918. The basis of rental is a net return of 4 per cent on the estimated value of the wharf property, with the requirement that the lessee shall make improvements and repairs. No appropriation has been made for making a general improvement of this water frontage, except an appropriation for the construction of fish wharves and wharf for the District property yard, nor for dredging adjacent to the wharves, and the wharf property, particularly the piling structures, is deteriorating rapidly.

Along the frontage are located the harbor police station, the dock of the harbor boat, the house and dock of the fire boat, the District morgue, a District property yard, and the municipal fish wharf and market.

WHARVES ALONG THE ANACOSTIA RIVER.

This frontage is largely undeveloped, owing to the uncertainty of ownership of the abutting land and riparian rights. One wharf which was formerly under lease has been turned over to the superintendent of sewers as a municipal wharf.

WHARVES ALONG THE GEORGETOWN CHANNEL.

All the wharf property along this frontage is under private control with the exception of the foot of streets. Two leases have been entered into with private parties—one for the foot of Thirty-third Street and the other for the foot of G Street NW.

JAMES CREEK CANAL.

The public space bordering this canal from N to P Streets is under lease. By an order of the commissioners, dated September 29, 1916, it was determined, in the interest of public health and sanitation, that the canal should be filled between N and P Streets, and the lessees were notified that their tenancy for the portion of the frontage between N and O Streets would not be extended after April 1, 1917, and between O and P Streets, after October 1, 1917.

DANIEL E. GARGES, *Chairman*,
D. E. McCOMB,
RUSSELL DEAN,

Wharf Committee.

The ENGINEER COMMISSIONER.

List of wharf property under lease Oct. 1, 1916.

POTOMAC RIVER FRONT.

Name of lessee.	Location.	Expires.	Water frontage.	Area.	Rental per year.
R. M. Allen.	Sec. 2, structures 39 and 40, foot of Ninth Street SW.	Mar. 15, 1917	<i>Lin. ft.</i> 40	<i>Sq. ft.</i> 2,400	\$85.00
Capital Yacht Club.	Foot of Ninth Street SW., between structures 39 and 41.	June 30, 1917	24	2,080	75.00
L. A. Clarke & Son.	Sec. 2, structures 68 to 77, inclusive, including 70½ feet Tenth Street SW.	Aug. 1, 1918	280	45,000	1,900.00
Colonial Beach Co..	Sec. 1, structures 31 to 37, inclusive, Water Street, between M and N Streets.	Mar. 15, 1918	132	8,000	500.00
Cranford Paving Co.	Foot of Thirty-first Street NW	Feb. 1, 1918	53	.....	240.00
J. Maury Dove Co. (Inc.).	Sec. 3, structures 39 and 40, foot of Thirteenth Street SW.	Monthly	168	38,000	1,570.00
G. W. Forsberg.....	Foot of G Street NW	.....do.....	100	.....	120.00
W. E. Garner.....	Sec. 2, structures 22 to 23, inclusive, except 24, foot of Eighth Street, SW.	Mar. 15, 1918	156	18,000	733.00
E. Madison Hall....	Sec. 2, structures 36, 37, and 38, foot of Ninth Street SW.	.....do.....	44	3,320	130.00
Wm. C. Hamburg..	Sec. 1, structures 26 to 30, inclusive, foot of N Street SW.	Sept. 30, 1917	120	7,000	460.00
Johnson & Wimsatt.	Sec. 3, structure 23, foot of Thirteenth Street SW.	Apr. 15, 1917	18	1,440	60.00
Mount Vernon & Marshall Hall Steamboat Co.	Sec. 3, structures 5 to 11, inclusive, foot of Twelfth Street, SW.	Mar. 15, 1918	190	43,500	2,244.00
Norfolk & Washington Steamboat Co.	Sec. 1, structures 59, 62, 63, and 64, foot of M Street SW.	.....do.....	125	10,000	600.00
Do.....	Sec. 1, structures 41 to 49, inclusive, and 57 to 69, inclusive, foot of M Street SW.	.....do.....	220	20,300	1,500.00
Potomac & Chesapeake Steamboat Co.	Sec. 1, structures 60 and 65 to 72, inclusive, foot of Seventh Street SW.	Dec. 31, 1916	190	44,000	2,345.00
Wm. A. Ragan....	Sec. 2, structures 11 to 21, inclusive, foot of Eighth Street SW.	Mar. 15, 1918	198	35,600	1,596.00
Jos. P. Stephenson, Stephenson & Bro.	Sec. 3, structures 21 and 22, foot of Thirteenth Street SW.	Mar. 15, 1917	65	4,200	100.00
Wimsatt & Church.	Sec. 2, structures 1 to 10, inclusive, foot of Seventh Street SW.	Jan. 31, 1917	300	59,900	2,300.00
District of Columbia:	Sec. 2, structures 34 and 35, foot of Ninth Street SW.	Mar. 15, 1918	80	18,000	720.00
Municipal fish wharf and market.	Sec. 2, structures 78 to 82, inclusive, and 85 to 97, inclusive, structures 98 to 129, inclusive.	.....	700	152,100	.....
Do.....	Sec. 3, structures 1 to 4, inclusive, Water Street, between Tenth and Twelfth Streets SW.	.....	126	11,015	.....
Property yard..	All water frontage on Water Street between H and I Streets SW.	.....	503	96,370	.....
Fire-boat wharf.	Sec. 1, structures 39 and 40, Water Street, between N and M Streets.	.....	.....	.....	.....
Morgue.....	Sec. 1, structures 41 and 42, Water Street, between N and M Streets.	.....	.....	.....	.....
Harbor master's wharf.	Sec. 1, structure 38, and sec. 2, slip between structures 41 and 42.	.....	.....	.....	.....
United States, site of central heat and power plant.	Water Street, between Thirteenth and-a-half and Fourteenth Streets SW.	.....	359	38,975	.....
Do.....	Sec. 3, structures 21 to 27, inclusive, foot of Thirteenth Street SW.	.....	200	26,600	.....
Total.....					17,278.00

ANACOSTIA RIVER FRONT (EASTERN BRANCH).

Lame of lessee.	Location.	Expires.	Water frontage.	Rental per year.
Harry D. Bailey.....	North side, just west of Anacostia Bridge to west abutment wall of old Anacostia Bridge.	Oct. 18, 1916	<i>Lin. ft.</i> 81	\$76.00
C. C. Carlsen.....	Water front, between building lines of Fourth Street SE.	June 1, 1917	50	50.00
Edward S. Dean.....	Water front, between the lines of N Street SE.	Monthly.....		67.50
Eastern Power Boat Club.	Directly west of the west abutment of the old Anacostia Bridge.	June 30, 1917	93	162.75
Lewis E. Smoot.....	Foot of Third Street SE., square 803.	Apr. 1, 1917	106.3	469.00
Standard Oil Co.....	Water front, between building lines of C Street SE.	Dec. 31, 1921		200.00
District of Columbia sewer division.	Foot of First Street SE., opposite lot 1, square south of square 744.		330	
United States Superintendent of Capitol Buildings and Grounds.	Foot of First Street SE., opposite square south of square 744.		40	
Total.....				956.25

JAMES CREEK CANAL, BETWEEN N STREET AND THE ANACOSTIA RIVER.

Name of lessee.	Designation.	Water frontage.	Rental per year.
W. A. Anderson.....	Part of parcel No. 8.....	<i>Lin. ft.</i> 127	\$158.75
Gallher & Hugely.....	Parcels Nos. 5, 7, 9, and 11.....	377	282.75
Robert Murphy.....	Parcels Nos. 1 and 3.....	445	173.50
Henry Raum.....	Parcel No. 31.....	50	25.00
Mrs. Frieda Rentz.....	Parcel No. 32.....	25	12.50
William Rentz.....	Parcels Nos. 27, 28, and 29.....	125	62.50
Washington Brick & Terra Cotta Co.....	Parcels Nos. 2 and 10.....	570	427.50
George C. Taylor.....	Part of parcel No. 8.....	136	225.00
Total.....			1,367.50

The above lessees have been notified that no leases will be extended for that portion of the canal between N and O Streets after April 1, 1917, and for that portion between O and P Streets after October 1, 1917.

TOTAL RENTALS.

Potomac River frontage.....	\$17,278.00
Anacostia River (or Eastern Branch) frontage.....	956.25
James Creek Canal.....	1,367.50
	19,601.75

REPORT OF THE ASSISTANT ENGINEER IN CHARGE OF ROCK CREEK PARK.

WASHINGTON, D. C., October 10, 1916.

The annual appropriation for care and improvement of the park was \$18,000. An itemized statement of the expenditure is given below:

Job No.	Work.	Labor.	Material.	Cost.
2900	General repair and care.....	\$8,074.32	\$620.67	\$8,694.99
2901	Farming.....	380.60		380.60
2902	Ross Road, macadamize.....	2,687.58	1,974.54	4,662.12
2903	Repair of foreman's quarters.....	87.00	2.38	89.38
2904	Oiling roads.....	466.48	233.14	699.62
2905	Bridge across Rock Creek.....	55.38	126.01	181.39
2906	Plumbing.....	19.25		19.25
2907	Bridle paths.....	601.21		601.21
2908	Cut and haul dead and fallen timber.....	1,342.92		1,342.92
	Blacksmithing.....			303.83
	Forage.....			465.44
	Tools and implements.....			29.21
	Harness (2 sets).....			119.94
	Boots.....			11.40
	Unpaid bills.....			302.56
	Balance.....			96.11
Total.....				18,000.00

The macadamizing of Ross Road, begun in the previous year, was completed. The expenditure for macadamizing the roadway during the year, including the necessary grading to widen it, was—

For material.....	\$1,974. 54
For labor.....	2, 687. 58
Total.....	4, 662. 12

A considerable quantity of dead and fallen timber was cleaned up, at a cost of \$1,342.92. This was mostly made into firewood, of which 220 cords were sold to the public schools and 30 cords were sold to private parties, the receipts for this being returned to the Treasury of the United States.

The bridle path along the west side of Rock Creek above the boulder bridge was widened and relocated for about three-fourths of a mile, so as to permit of two horses being ridden abreast without danger, and this path was connected with the system farther west.

Sufficient corn and hay was raised in the park to feed the horses, but oats and bran were required to be purchased.

A steadily growing use of the park for picnics was noted, increasing the work of care of the grounds. Additional temporary toilet facilities were supplied. Two baseball diamonds were laid off. The swimming pools were provided with rustic shelters for use of the bathers. One new swimming pool was established near the Pebble Bridge, and trees were planted to screen it from the road.

The use of the localities known as Camp Good Will and the Baby Hospital by the Associated Charities was continued, and temporary additions to the buildings were made by them.

It is proposed during the coming year to clear of undergrowth as much as possible the area of the park adjacent to roadways and in the more frequented sections and in Piney Branch Parkway; to extend the system of bridle paths and footpaths, and to construct another line of roadway crossing the park.

Respectfully submitted.

L. R. GRABILL,
Assistant Engineer Rock Creek Park.

The ENGINEER COMMISSIONER,
District of Columbia, Secretary, Board of Control, Rock Creek Park.

REPORT OF SUPERINTENDENT OF STABLES.

WASHINGTON, D. C., *October 10, 1916.*

SIR: I have the honor to submit the following report showing the operation of the stables under the care of the superintendent of stables, engineer department, District of Columbia, for the fiscal year 1916.

LIST OF FIVE STATEMENTS ATTACHED.

1. Location of stables and departments using same.
2. Number of employees and departments to which assigned.
3. Number of horses, mules, vehicles, and harness, and departments to which assigned.
4. Amount of appropriations allotted and expenditure of same.
5. Average cost of upkeep of horses.

The Congress of the United States in making appropriations for the District of Columbia does not provide funds for the operation and maintenance of the engineer stables, except to the extent of designating and making provision for several annual employees. This, therefore, necessitates the superintendent requesting the several heads of the departments to annually make allotment to the superintendent on a pro-rata basis from appropriations designated by said head for the maintenance of the stables. This method, however, was revised by Maj. J. L. Schley, assistant to the engineer commissioner, District of Columbia, and last year witnessed the inauguration of his simplified plan whereby funds were acquired with which to operate the stables, the same being as follows: (1) Overhead charges, or transportation for the assistants to the engineer commissioner, District of Columbia; (2) departmental charges; and (3) quarterly requisitions on departments for forage and other supplies. Since this system has been in force it has proven entirely satisfactory as well as greatly diminishing the number of papers handled.

It is recommended, on account of its value as a pasturage, that the commissioners continue to retain control of the land in Rock Creek Park some time ago courteously loaned to them by the board of control of that park for that purpose. This tract has now attained a high state of cultivation for grazing, and in view of the fact that animals in order to be kept in the best physical condition should have a certain period of rest each year, it is aimed to so treat them, and for this purpose we have available the above farm, where they are free from work, shoes, and harness and may roam as they see fit. Several other departments of the District owning horses, appreciating the value of such a place, take advantage thereof.

Respectfully,

J. W. BEALE,

Superintendent of Stables.

The ENGINEER COMMISSIONER.

STATEMENT NO. 1.—*Location of stables and departments using same.*

1. *First and Canal Streets SW.*—Disbursing officer; plumbing inspector; sewer department; surface division (part); surveyor; weights, measures, and markets.
2. *Second and Canal Streets SW.*—Electrical department.
3. *U Street stables, U Street between Sixteenth and Seventeenth Streets NW.*—Municipal architect, repair shop, surface division (part), engineer commissioner and assistants.

STATEMENT NO. 2.—*Number of employees and departments to which assigned.*

	Employees.					
	Annual.			Per diem.		
	Black-smiths.	Drivers.	Watch-men.	Drivers.	Stable-men.	Watch-men.
All.....			2		3	1
Electrical department.....				1		
Engineer commissioner and assistants.....				12		
Municipal architect.....				1		
Plumbing inspector.....				1		
Repair shop.....				3		
Sewer department.....				28		
Surface division.....	1			3		
Surveyor.....				3		
Weights, measures, and markets.....		1				

STATEMENT NO. 3.—*Number of horses, mules, vehicles, and departments to which assigned.*

	Horses.	Mules.	Vehicles.	Harness (sets).
Disbursing office.....	1		1	1
Electrical department.....	4		4	2
Municipal architect.....	1		1	1
Plumbing inspector.....	1		1	1
Repair shop.....	8	3	6	5
Sewer department.....	10	27	40	36
Surface division.....	18	13	30	33
Surveyor.....	3		3	3
Weights, measures, and markets.....	3		4	3
Emergency.....			2	
Horses.....				49
Mules.....				43
Total.....				92

NOTE.—2 horses and 1 mule died during the year.

STATEMENT No. 4.—*Amounts of appropriations allotted and expenditures of same.*

Department.	Allotment.
Electrical.....	\$379. 16
Miscellaneous trust fund deposits.....	492. 88
Municipal architect.....	865. 71
Sewer department.....	1, 701. 61
Street-cleaning division.....	181. 62
Surface division.....	1, 483. 54
Surveyor.....	105. 62
Water department.....	453. 76
Total.....	5, 663. 90

Of this total allotment of \$5,663.90 there was expended for—

Forage.....	\$647. 96
Pay rolls.....	4, 590. 70
Supplies.....	243. 30

leaving a balance of \$181.94, which was returned to the appropriation.

STATEMENT No. 5.—*Average cost of upkeep of horses during fiscal year 1916.*

Forage (allowance for 1 horse for 1 month):	
100 pounds rye straw, straight, No. 2, at \$0.796 per 100 pounds.....	\$0. 80
210 pounds long timothy hay, at \$1.04 per 100 pounds.....	2. 18
210 pounds mixed clover hay, at \$1 per 100 pounds.....	2. 10
354 pounds oats, at \$1.687 per 100 pounds.....	6. 48
50 pounds bran, at \$1.27 per 100 pounds.....	. 64
Total cost of forage for 1 horse per month.....	12. 20
Forage for 1 horse for 1 year.....	146. 40
Shoes, 80 cents per month.....	9. 60
Total.....	156. 00

REPORT OF SUPERINTENDENT OF THE DISTRICT BUILDING.

WASHINGTON, D. C., October 9, 1916.

GENTLEMEN: We have the honor to report, in addition to the routine work incident to the maintenance, repair, and operation of the District Building and its power plant for the fiscal year 1915-16, the following:

The refrigerating plant used in connection with the cool drinking water system had deteriorated to an extent which necessitated the renewal of certain essential parts. Anticipating the change in the source of power from the District Building plant to the central station, a compressor was provided, thereby changing the system from the absorption type, which requires live steam, to the compression type, which does not. New expansion coils were also installed.

All direct pneumatic tubes to the office of the collector of taxes were extended, by direction of the commissioners, from the east end of the room to the center, in order to have their terminals in close proximity to the cashier's cage, and has resulted in material improvement in this service.

The entire detective bureau, located in the basement, was remodeled to meet the needs of increased business of that department.

A small fire occurred in room 1, which is a storeroom of the police department, on November 2 last, and it was extinguished with the building fire apparatus by members of the fire department, with the assistance of the watch force. The damage to the building was \$25, and to contents, according to an estimate of the property clerk of the police department, \$50.

During the year 20 per cent of the lighting system in the office rooms was changed from the direct to the semi-indirect type, making the total semi-indirect lighting now 65 per cent. In the report of this office for the previous fiscal year it was stated that the additional current required for the semi-indirect method would be more than offset by a saving in fuel effected by the improved power plant methods inaugurated in May, 1915.

The total current generated for the fiscal year 1914 was 400,840 kilowatt-hours, of which 264,985 kilowatt-hours were consumed in lighting, and in 1916 the total was 451,120 kilowatt-hours, of which 314,290 kilowatt-hours were consumed in lighting—an increase in the lighting load for 1916 of 18½ per cent. The fuel consumed in 1914

was 1,993 tons at an approximate cost of \$7,250, and in 1916, 1,733 tons at a cost of \$6,020—a decrease for 1916 of 13 per cent in weight and 17 per cent in value.

During the year 29,752 kilowatt-hours of current were furnished the electrical department for the telephone, fire-alarm, and police patrol box system; and electrical power, steam, compressed air, and hot water for industrial purposes were supplied to two laboratories of the health department and the laboratory of the inspector of asphalt and cement.

On January 17, 1916, by direction of the commissioners, this office took over the emergency printing, and, on February 1, blue printing and photography, between which dates and June 30, 231 printing jobs were completed for the various departments at a total cost of \$1,417.09, 31,059 square feet of blue printing at a total cost of \$376.93, and photography to the value of \$292.75.

Very respectfully,

R. G. POWELL,
Captain, Corps of Engineers, United States Army,
J. J. LOVING,
Captain, Corps of Engineers, United States Army,
Jointly Superintendents, District Building.

The COMMISSIONERS OF THE DISTRICT OF COLUMBIA
(Through the Engineer Commissioner).

REPORT OF THE BOARD FOR THE CONDEMNATION OF INSANITARY BUILDINGS.

GENTLEMEN: We have the honor to submit the following report of the transactions of the board for the condemnation of insanitary buildings for the year ending June 30, 1916.

Buildings on which action was taken in response to notice for the year ending June 30, 1916

	Demolished.	Repaired.	Pending.
Buildings in alleys.....	16	32	18
Buildings in streets.....	48	57	23
Total.....	64	89	41

Buildings acted upon since the creation of the board for the condemnation of insanitary buildings up to and including June 30, 1916.

	Examined.	Demolished.	Repaired.	Pending.
Buildings in alleys.....	3,880	664	490	18
Buildings in streets.....	2,703	1,376	1,037	23
Total.....	6,583	2,040	1,527	41

Total number of meetings of the board for the condemnation of insanitary buildings for the year ending June 30, 1916.....	7
Preliminary notices served.....	56
Condemnation notices served.....	11
Condemnation signs affixed to buildings.....	11
Inspections and miscellaneous visits made in connection with the service of notices.....	2,567
Cases referred to other departments for appropriate action under existing regulations.....	281
Estimated number of tenants required to secure other quarters through action on the part of the board for the condemnation of insanitary buildings for the year ending June 30, 1916.....	176
Total number since the creation of the board.....	5,947
Estimated number of tenants benefited by repairs for the year ending June 30, 1916.....	267
Total number since the creation of the board.....	5,116

Four cases have been referred to the corporation counsel for appropriate action in the police court, which resulted in the vacation of the buildings in question.

Repairs have been made on the basis of informal requests of the board by many owners and agents on buildings, both in streets and alleys, for which no notices were served, and consequently no record was kept by the board.

R. G. POWELL,
Captain, Corps of Engineers, United States Army,
Assistant to the Engineer Commissioner.

WM. C. WOODWARD, M. D.,
Health Officer, District of Columbia.

MORRIS HACKER,
Inspector of Buildings, District of Columbia.
Board for the Condemnation of Insanitary Buildings.

To the COMMISSIONERS OF THE DISTRICT OF COLUMBIA.

APPENDIX.

SPECIFICATIONS FOR PAVING STREETS AND AVENUES WITH SHEET ASPHALT.

1. *Work.*—The work to be done under this proposal and contract will consist of paving with sheet asphalt or asphalt block such streets, avenues, and roads in the District of Columbia, or parts thereof, or doing any portion of such work, as may be ordered in writing by the Commissioners of the District of Columbia under appropriations for the fiscal year ending June 30, 1917.

A list of streets expected to be paved under this contract will be furnished on application. In case the price bid justifies such action, the commissioners reserve the right to add streets to this list. The commissioners also reserve the right to regulate the order in which the work shall be executed, as may appear most advantageous to the District. All work under the contract must be completed prior to June 30, 1917, unless authorized by the engineer commissioner to be completed at a later date.

2. *Amount of work.*—The estimated amount of the work is as follows:

	Square yards.
Standard sheet-asphalt pavement on concrete base.....	81,000
Vitrified block gutters on concrete base.....	5,200
Asphalt block.....	6,400

These amounts are approximations only and may be considerably varied from, but they will be used in canvassing bids, and the awards will be based thereon. Bids will be scheduled on the basis of the prices named for pavements with a 6-inch concrete base, but the prices named for a 5-inch base will be incorporated in the contract, and such work as may be so directed will be executed and paid for as such.

3. *Bids.*—The contractor will, for the prices bid, do all the work prescribed in these specifications; do all the necessary grading and trimming of the roadbed and all rolling; provide bridges, fences, and other means of maintaining travel on intersecting streets, roads, and railroads, and all private driveways, after giving due notice to parties affected thereby; maintain the same in good and safe condition as long as may be necessary, and then remove such temporary expedients and restore such roads to their proper condition; provide watchmen, lights, fences, and other precautionary measures necessary to the protection of person and property; furnish all materials (except as specified) and all tools and implements, labor, and transportation required to lay and put in complete order for use the specified pavement; and do each and all of these to the satisfaction of the engineer. Upon the completion of the work he will remove any temporary structures erected during the progress of the work and restore all fixtures, pavements, and parkings, both public and private, to satisfactory condition.

4. *Old material.*—Old material removed from the streets will be the property of the District of Columbia, and the work of removal will be paid for at prices named in paragraph 14 of these specifications. Granite blocks, cobble, old curb, etc., must be removed to the nearest property yard, or to such other places as the engineer may direct.

5. *Grading and subgrade.*—Lines and grades will be established by the engineer, and no work will be commenced until these are given. The area over which the pavement is to be laid must be excavated to the proper depth below the surface of the pavement when completed, any objectionable or unsuitable matter below the bed being removed to such depth as may be directed by the engineer, and the space filled with suitable material thoroughly compacted. The bed, after being trimmed so as to be parallel to the surface of the pavement when completed, will be thoroughly compacted by rolling with a roller weighing not less than 5 tons, and by heavy ramming at places which can not be reached by the roller, dampening the bed before rolling and ramming, if required, to the satisfaction of the engineer. No extra allowance will be made for trimming or rolling, but the volume of earth, etc., removed will be paid for as grading of its class. Any filling will be done in layers not exceeding 12 inches in thickness, and all materials used for this purpose will be subject to approval. If improper or unsuitable material be used, it will be removed at the cost of the contractor. All measurements will be made in place, and payments made thereon. Should the grading involve work in both "cut" and "fill," the measurement of it will be computed on the basis of the volume of the material in place in the "cut" only; the excavated material from the "cut" section deposited in the "fill" will not be again paid for as "fill." Should the amount of cut on the street not suffice to make the necessary fill, the amount borrowed from other designated localities will be paid for as grading.

6. *Six-inch concrete base.*—Upon the bed prepared as described in paragraph 5 there will be laid 6-inch foundations of concrete as directed, made of the following materials by volume:

One part Portland cement, 3 parts sand, 7 parts gravel.

Broken stone, run of the crusher, may be substituted for part or all of the gravel at the option of the contractor.

(a) *Cement.*—The cement used will be a standard brand of Portland cement, uninjured by age or exposure, and delivered at the work in original undamaged packages. The right is reserved to reject any cement that has not established itself as a high-grade Portland cement and has not been made by the same mill for two years and given satisfaction in use for at least one year under climatic and other conditions of at least equal severity as those of the work proposed. The contractor shall keep the cement in store, under proper cover, in the city of Washington, and shall properly protect it until used. The engineer shall have the right to test the cement as he judges necessary and to reject any or all lots. The cement, after being accepted, can not be transferred or used by the contractor on other work without the consent of the engineer commissioner. The cement while in storage or upon the work or while being hauled upon the work shall be properly protected, and no cement shall be used which, in the opinion of the engineer, has been injured by age or exposure.

No cement shall be used upon the work until it has been tested in the office of the engineer commissioner and accepted by him, the tests to extend over such length of time, not exceeding seven days, as the engineer commissioner may think necessary.

Cement furnished by the contractor that has been tested and accepted by the Bureau of Standards and that is identified as such will be subject only to the following rebtests by the District of Columbia: Firmness, initial set, hard set, 24-hour tensile.

(b) *Sand.*—The sand used shall be clean, sharp river or pit sand, containing both fine and coarse grains, but free from sewage, mud, clay, mica, paper, leaves, chips, or other foreign matter, and not showing when shaken with water and after subsidence more than 5 per cent, by volume, of silt.

(c) *Broken stone.*—Stone used in concrete must be hard, durable, and properly broken to a size small enough to pass through a ring 2 inches in diameter when the run of the crusher is substituted for gravel. The run of the crusher shall not contain over 1 per cent of material passing a No. 10 sieve. The stone shall be thoroughly cleansed from all foreign substance, and shall be screened and washed, if so ordered by the engineer. Sand, detritus, or any material other than hard, angular fragments of stone, will be considered foreign substances.

(d) *Gravel.*—Gravel shall be clean, washed gravel and shall not contain pebbles greater than 2 inches in their largest dimensions, and shall run from that down to pea size, well graduated.

(e) *Water.*—Water used for mortar and concrete shall be fresh and clean, free from earth, dirt, or sewage, and shall be used in such quantity as the engineer may direct.

(f) *Platforms.*—Platforms shall be provided, if so ordered by the engineer, upon which all sand, gravel, and broken stone for concrete shall be placed when brought upon the line of the work, and kept there until used.

(g) *Mixing.*—The thorough mixing and incorporation of all material will be insisted upon. If done by hand labor, the dry cement and sand shall be turned over and

mixed with shovels by skilled workmen not less than six times before the water is added; the stone or gravel, after being drenched with water, shall be added to the mixed sand and cement; the drenching shall not be done while the stone or gravel is in the wheelbarrow; the whole mass shall be thoroughly turned over with shovels not less than four times, and mixed upon a water-tight platform until every particle of stone or gravel is completely enveloped with mortar. The whole operation of mixing and laying each batch shall be performed as expeditiously as possible, by the aid of machinery or a sufficient number of skilled men. If the concrete is mixed in batches requiring one barrel of cement, the platform must not be smaller than 10 feet by 12 feet, nor will a larger amount of concrete than can be made with one barrel of cement be allowed to be mixed in one batch by hand. In mixing by machinery the materials must be so delivered as to insure a uniform product of the specified proportions of all ingredients to the satisfaction of the engineer.

(h) *Setting*.—Concrete shall not be used after it has begun to show evidence of setting. No concrete which has once set shall be used as material for mixing a new batch.

Each batch of concrete, after being mixed, shall be spread in place in horizontal layers by means of shovels so as to give the requisite thickness after being tamped and shall then be thoroughly compacted. Any evidence of lack of compaction will be regarded as sufficient reasons for removal and replacement of the base. Hauling over base less than three days old will not be allowed unless planks are laid.

7. *Five-inch concrete base*.—All provisions of the specifications for a 6-inch concrete base shall apply to a 5-inch concrete base, which shall differ from the 6-inch base only in respect to the thickness thereof and the price paid therefor.

8. *Asphalt binder*.—The binder course shall be composed of broken stone, equal in quality to the stone specified for concrete base, its largest dimension passing an inch-and-a-quarter screen, and the stone, after passing the heating drums, shall not contain less than 5 nor more than 15 per cent of material passing a No. 10 screen.

The stone will be heated not higher than 350° F. in suitable appliances. It is then to be thoroughly mixed by machinery with asphalt cement, such as is acceptable for surface cement, penetration 60 to 90, at such temperature and in such proportions that the resulting binder will have life and gloss without an excess of cement. Should it appear dull from overheating or lack of cement, it will be rejected. While hot it will be hauled upon the work, spread upon the base so that when compacted it will be at least 1½ inches in thickness, and immediately rammed and rolled until it is cold. Should the resulting course not show a proper bond, it must be immediately removed and replaced by and at the expense of the contractor. Binder and top shall not be taken from the yard to the site of the work when, in the judgment of the engineer, weather conditions are unsuitable for the work of laying the pavement.

The contractor shall not enter upon a concrete base in order to lay the binder course until it has obtained sufficient strength for such a purpose, and during the period between laying the base and binder he shall properly protect it, and, when ordered by the engineer, shall sprinkle it in warm weather between the hours of sunrise and sunset as often as may be deemed necessary, and in cold weather cover it with a material suitable for its protection.

9. *Asphalt wearing surface*.—The wearing surface of the pavement shall be composed of asphalt cement (refined asphalt and asphaltic flux); clean, sharp-grained sand; fine absorbent mineral dust.

(a) *Asphalt*.—The asphalt shall be refined until homogeneous and free from water and shall not at any time be heated to a temperature high enough to injure it, and 100 parts of the refined product shall require not more than 30 parts of flux to produce the asphalt cement described in paragraph 9-c.

The asphalt for class (a) work shall conform to such tests as will establish its identity as a product of the refinement of a natural crude asphalt without the admixture of any other material.

The refined asphalt for class (b) work shall be the product of refinement of an unadulterated natural asphaltic oil, and shall contain, after refinement, not less than 90 per cent of bitumen soluble in carbon bisulphide.

(b) *Asphaltic flux*.—The flux used in the manufacture of asphalt cement shall be an asphalt oil from which the lighter oils have been removed by distillation without cracking, until the flux has the following characteristics: Free from water and foreign matter; flash point, not less than 300° F.; distillate at 400° for 18 hours, less than 10 per cent. The flash point shall be taken in New York State closed oil tester. The distillate shall be made with about 50 grams of flux in a small glass retort, provided with a thermometer and placed in a copper holder. The residue in the retort, after distilling, must be free from coke. Any other softening agents approved by the engineer commissioner may be used in place of asphaltic flux.

(c) *Asphalt cement*.—The asphalt cement must be of refined asphalt, fluxed when necessary with asphaltic oil, refined maltha, or other approved flux. The cement

must be practically free from water and must be within the range of 40 to 70 penetration when tested at 77° F. on Dow penetration machine with No. 2 needle, 100 grams, 5 seconds. The degree of penetration to be fixed by the engineer commissioner.

Preference will be given to an asphalt cement that is not readily affected by water, provided it is satisfactory in other respects. The use of an asphalt under these specifications shall be subject to the approval of the engineer commissioner, and if an asphalt has been proposed for use by the contractor and approved by the engineer commissioner no change in the asphalt to be used shall be made unless with the approval of the engineer commissioner. If an asphalt or flux is submitted for use which has not been successfully used for a period of at least two years for paving under conditions similar to those existing in the District of Columbia, its use may be limited to such extent as may be deemed advisable, or it may be rejected for use entirely in the discretion of the engineer commissioner.

The asphalt cement must comply with the following tests:

1. It must be of such consistency that when tested at 32° F. it will not show a hardness below 10 penetration, and when tested at 115° F. it will not be softer than 350 penetration.

2. When a briquette of the cement having a minimum cross section of 1 square centimeter, having a penetration of 50 to 53 degrees at 77° F. is tested for ductility at 77° F., the bitumen must stretch at the rate of 5 centimeters per minute to a distance of 25 centimeters before breaking.

3. When the cement is heated in an open tin box $\frac{3}{4}$ inch deep by $2\frac{1}{2}$ inches in diameter at a temperature of 300° F. for seven hours, in a hot-air oven, it must not show a loss by volatilization of over 5 per cent and must not have been hardened over 30 per cent by this heating.

The asphalt cement must never be heated to a temperature that will injure it.

When the asphalt cement contains over 5 per cent of material that will separate by subsidence while in a molten condition it must be thoroughly agitated before drawing from storage and while in use in the supply kettles so as to insure a uniform cement.

These properties shall be determined by tests made by uniform methods, as adopted in the office of the engineer commissioner.

(d) *Sand*.—The sand to be used shall be free from mud, hard grained and moderately sharp. On sifting it should have at least 15 per cent of material that would be caught on a 40 mesh per inch screen, 25 per cent of material that will pass an 80 mesh to the inch screen, and 10 per cent at least must pass a 100 mesh to the inch screen. If the sand to be used does not contain the desired fine material, mineral dust may be added to make up the deficiency, and in any case at least 5 per cent of such mineral dust shall be used. The amount of fine material may be increased at the discretion of the engineer commissioner.

(e) *Mineral dust*.—This shall be any fine Portland cement or limestone dust, the whole of which shall pass a 30-mesh screen, and at least 85 per cent pass a 100-mesh screen.

(f) *Asphalt paving mixture*.—The materials complying with the above specifications shall be mixed in proportion by weight depending upon their character and the traffic on the street, and upon the character of the asphalt, and will be determined by the engineer commissioner, but the percentage of bitumen in any mixture soluble in carbon bisulphide shall not be less than 9 nor more than 13 per cent. If the proportions of the mixture are varied in any manner from those specified the mixture will be condemned; its use will not be permitted; and, if already placed on the streets, it must be removed and replaced by proper materials at the expense of the contractor.

The sand or the mixture of sand and stone dust and the asphalt cement will be heated separately to about 300° F. The dust, if limestone, will be mixed while cold with the hot sand in the required proportions and then mixed with the asphalt cement at the required temperature, and in the proper proportion in a suitable apparatus, so as to effect a thoroughly homogeneous mixture. Sand boxes and asphalt gauges will be weighed in the presence of inspectors as often as may be desired.

Samples of all material entering into the composition of the pavement shall be supplied to the inspector of asphalt and cements when required, in suitable tin boxes and cans; he shall have access to all branches of the works at any time and shall have the right to obtain samples of all materials from the source of supply.

(g) *Laying asphalt surface*.—The asphalt paving mixture, prepared in the manner described, will be hauled to the site of the work at a temperature of not less than 250° or more than 350° F. in trucks or wagons, canvas covers being provided for use in transit. It will then be shoveled into place and thoroughly spread to a thickness of at least $2\frac{1}{2}$ inches by means of hot iron rakes, in such manner as to give uniform and regular grade, so that after having received its ultimate compression it will have a net thickness of at least $1\frac{1}{2}$ inches. This depth will be constantly tested by means of gauges furnished

by the engineer commissioner. The surface will then be compressed by steam rollers; first, with a roller weighing not less than $2\frac{1}{2}$ tons, after which a small amount of hydraulic cement will be swept over it, and it will then be thoroughly compressed by a steam roller weighing not less than 10 tons, the rolling being continued for not less than five hours for every 1,000 yards of surface. The street to be barricaded, the barricades to remain for such length of time as deemed necessary by the engineer commissioner. Binder or topping shall not be laid when in the judgment of the engineer weather conditions are unsuitable for the work of laying the pavement.

10. *Laying vitrified blocks.*—Vitrified-block gutters will ordinarily be $13\frac{1}{4}$ inches wide, laid on a concrete base 6 inches in depth, of the same material and proportions and laid in the same manner as prescribed in these specifications for the concrete base under asphalt pavements.

As soon as practicable after the concrete base has been laid, a dry mixture, composed of four parts of the sand specified in paragraph 6-b and one part of Portland cement, thoroughly mixed, will be spread thereon to the depth of not less than one-half inch, as a bed for the paving blocks, and regulated so as to be exactly parallel to the finished grade of the gutter.

On the bed thus prepared for them the blocks will be set on edge, with the longest dimensions at right angles to the curb, or as directed by the engineer.

The longitudinal joints of each course of blocks laid must be broken by a lap of not less than 4 inches.

The blocks will then be carefully rammed by placing a plank over several courses and ramming the plank with a heavy rammer. The ramming will be continued until the blocks reach a firm, unyielding bed and present a uniform surface, with proper grade. Any lack of uniformity in the surface or defect in the grade must be corrected by taking up and relaying the blocks.

After proper ramming the entire gutter will be thoroughly grouted with a thin, easily flowing grout, of neat Portland cement.

A similar construction of block to that described for the gutters may be used adjacent to railroad tracks; the base will in that case extend to the bottom of the cross-ties, or at least 6 inches thick.

The blocks will be furnished the contractor at the district property yards, and must be hauled to the work at his expense.

13. ADDITIONAL WORK.

The following specifications will cover incidental work which may be required of the contractor:

(a) *Setting 6 by 20 inch granite and bluestone curb.*—This curb will be set in the following manner: A trench parallel to the curb line, having a depth of 24 inches below the top of the curb when set, and 20 inches wide, will be excavated to receive the curb and its gravel bed; the dimensions of the trench, in width, will be 14 inches from the curb line toward the building line of the street, and 6 inches from said curb line toward the center line of the street. In the trench thus prepared the curb will be set, and brought to line and grade, with plumb face. Spalls of stone, hard-burned brick, or other acceptable substance prepared for the purpose, will be used to adjust the curb to grade, and these spalls will be so placed and adjusted as to support the curbing permanently, and afford a firm and stable support for it, without the use of small chips and fragments, used as "shimming" pieces, to wedge the stone in place. After the curb has been properly placed, and adjusted to line and grade, the trench will be filled with gravel of approved quality, to within 8 inches of the top of the curb, the filling to be done in layers of not more than 3 inches in depth and thoroughly compacted by suitable ramming. Close contact joints and even surfaces must be made, and the lines and grades furnished strictly followed.

(b) *Setting 8 by 8 inch granite curb.*—This curb will be set in the following manner: A trench parallel to the curb line, having a depth of 15 inches below the top of the curb when set, and 18 inches wide, will be excavated to receive the concrete and the curb. The dimensions of the trench in width will be 14 inches from the curb line toward the building and 4 inches from the curb line toward the center line of the street. In this trench thus prepared a bed of concrete, composed of 1 part of Portland cement, 4 parts of clean concrete sand, and 10 parts of screen pebbles, will be laid, filling the trench to a depth of 5 inches, the material to be mixed and laid under the same conditions as prescribed for laying cement concrete base for sheet asphalt pavements. On the base prepared and laid as above, the curb will be placed before the concrete has set, and adjusted to line and grade by setting it to a firm, unyielding bearing in a bed of freshly made concrete, by the use of heavy wooden mauls. The face of the curb must be plumb and true to line, and the top of it carefully set to grade with close and

even contact joints. After the curb has been set to line and grade, the trench on the footwalk side will be immediately filled with concrete to within 5 inches of the top of the curb, which will be thoroughly rammed and compacted, after which it will immediately be covered with earth to prevent injury to it through too rapid evaporation, etc. In case vitrified block gutters are to be laid in front of the curb, any portion of the concrete base of the curb that would interfere with the laying of such gutters must be removed immediately after the curb is set.

(c) *Resetting 6 by 20 inch granite and bluestone curb.*—The work to be done under this classification is identical with that specified for setting this class of curb, except no hauling of the curb is required other than that incidental to the necessary disposition of it upon the line of the work. Under this classification also, the curb may be adjusted to line and grade without removing it from its trench, if so ordered by the engineer.

(d) *Resetting 8 by 8 inch granite curb.*—The work to be done under this classification is identical with that specified for setting this class of curb, except that no hauling of the curb is required other than that incidental to the necessary disposition of it upon the line of work, and no new concrete is required other than that sufficient to imbed the stone and back and adjust it to line and grade.

(e) *General instructions.*—All curb will be furnished to the contractor at the District property yard, and will be hauled by him to the site of the work; any curbing unaccounted for, or improperly disposed of, or damaged, or broken, through careless or unskilled handling, will be charged against him, and the value of the loss to the District will be deducted from any amount due the contractor for work done, as determined by the engineer.

All expenses connected with or incidental to the work of setting or resetting curb, as described above, including the hauling of the curbing, preparing the curb trenches, and the necessary grading connected therewith, furnishing gravel and spalls, furnishing and placing concrete, and all other material and labor necessary to execute the work in accordance with the specifications therefor, are included in the fixed price for the respective items as hereinafter stated. The cost of dressing, jointing, or cutting the curb will be paid for additionally, but no other claim for additional compensation will be entertained. Should the adjoining brick footwalks be disturbed in order to set or reset the curb the portion so disturbed shall be repaved, if required by the engineer, without cost to the District.

14. *Prices for additional work.*—Contractors must do such additional work incident to the construction of new pavements as may be ordered on each street by the engineer commissioner. All such work shall be in accordance with current District specifications. Prices paid for this work will be as stated below:

- (1) Removing old curb including haul, not to exceed 2 miles, 8 cents per linear foot.
- (2) Hauling same beyond distance of 2 miles, 1 cent per linear foot per mile.
- (3) Hauling from District property yard and setting 6 by 20 inch curb, 25 cents per linear foot.
- (4) Resetting 6 by 20 inch granite and bluestone curb, 25 cents per linear foot.
- (5) Hauling from District property yard and setting 8 by 8 inch curb, 35 cents per linear foot.
- (6) Resetting 8 by 8 inch curb on new concrete base, 31 cents per linear foot.
- (7) Resetting 8 by 8 inch curb on old concrete base, 15 cents per linear foot.
- (8) Dressing, jointing, and cutting curb, etc. (stonecutter's time), including setting-up labor, 65 cents per hour.
- (9) Removing old rubble, cobble, flagging stone and brick, vitrified block or brick, etc., including haul not to exceed 2 miles, 15 cents per square yard.
- (10) Removing old asphalt blocks, including haul not to exceed 2 miles, 20 cents per square yard.
- (11) Removing old granite block, including haul not to exceed 2 miles, and removal of old paving bed and cleaning concrete base where same exists, 25 cents per square yard.
- (12) Overhaul on items 9, 10, and 11, 1 cent per square yard per quarter mile or fraction thereof.
- (13) Removing old coal-tar or asphalt surface and binder from concrete base in connection with resurfacing work, including haul, 12 cents per square yard.
- (14) Grading and hauling earth, not to exceed 1,000 feet, 60 cents per cubic yard.
- (15) Grading and hauling macadam not to exceed 1,000 feet, 60 cents per cubic yard.
- (16) Removing old coal-tar and bituminous pavement or base of the class laid since 1880 and hauling not to exceed 1,000 feet, \$1 per cubic yard.

- (17) Removing old coal-tar and bituminous pavement or base of the class laid prior to 1880 and hauling same not to exceed 1,000 feet, \$1.85 per cubic yard.
- (18) Removing old concrete base and hauling not to exceed 1,000 feet, \$1.50 per cubic yard.
- (19) Hauling excavated material, per 100 feet, over first 1,000 feet, 1 cent per cubic yard.
- (20) Laying or relaying vitrified brick or block on old concrete base, 60 cents per square yard.
- (21) Laying vitrified block on new concrete base in connection with asphalt block pavement, \$1.30 per square yard.
- (22) Laying or relaying asphalt block and vitrified brick or block on gravel base, 40 cents per square yard.
- (23) Cleaning old vitrified brick or block for relaying, 25 cents per square yard.
- (24) Laying and relaying granite block, 75 cents per square yard.
- (25) Relaying cobble and rubble, 30 cents per square yard.
- (26) Repairing cement walks including haul, \$1.50 per square yard.
- (27) Repairing brick walks, 25 cents per square yard.
- (28) Laying Portland cement concrete base in place, \$5 per cubic yard.
- (29) Adjusting manhole tops and basin covers to grade, \$1.50 each.
- (30) Adjusting water-valve casings to grade, \$3 each.
- (31) Asphaltic top, 47 cents per cubic foot.
- (32) Asphaltic binder, 39 cents per cubic foot.
- (33) Adjusting electric-light or telephone manhole tops to grade, as follows:
 - (a) Size, less than 6 square feet area, \$1 each.
 - (b) Size, over 6 and less than 16 square feet, \$2 each.
 - (c) Size from 16 to 28 square feet, \$4 each.

15. *Extra work.*—The contractor must be prepared to do any extra work that may be ordered in writing by the engineer, and for this he will be paid at current rates for work of a similar character, or, if the extra work should be of a class for which no rate is fixed by current contracts, the actual reasonable cost to the contractor, as determined by the engineer, plus 15 per cent of said cost. The contractor shall have no claim for compensation for extra work unless same is ordered in writing by the engineer. All additional and extra work shall conform to current District of Columbia specifications therefor.

16. *Guarantee.*—All work under this contract will be guaranteed and kept in repair by the contractor without cost to the District of Columbia for a period of one year from date of its completion as indicated on the final voucher for each street.

It is further expressly understood and agreed that if any of the pavements laid should, for any reason whatsoever, within the period of one year, prove inferior to the best laid in the District prior to July 1, 1916, then the contractor shall, on demand of the commissioners, remove such defective pavements and relay them with new material of approved quality. The engineer commissioner shall decide the question of inferiority.

On expiration of guarantee for maintenance the work is to be inspected, and all imperfections must be corrected where and to such extent as the engineer shall direct, upon which the engineer will accept the same in writing, and until such acceptance the guarantee shall be in force. Repairs that may become necessary during the guarantee period will be made by the contractor when ordered by the engineer commissioner.

If the contractor fails to make such necessary repairs after notice to do so, the commissioners may cause such work to be done, and the contractor and the surety or sureties under the bond shall be jointly and severally liable for the cost of the same.

17. *Cuts.*—Contractors shall be responsible for any work done upon any street over plumbers' cuts or other work done by the permission of the commissioners before the work is begun.

18. *Modification.*—The commissioners reserve the right to modify these specifications as may from time to time seem desirable. The amount of compensation, if any, due the contractor for said modifications will be determined by the engineer commissioner on the same basis as in the case of extra work.



